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Index to Advertisers—See page xl.

Principal Contents:

	PAGE
Differential Tariffs	741
Modern Methods in Holland. By Nina Dyson Rayner	744
Village Street Lighting. By W. A. Turnbull and A. Logan	745
The Weaver Valley Span	746
The A.C. Lift Controller. By W. Woodiwiss	747
A New Architectural Lamp	749
Water Heating and Electrolysis. By Eric Chisholm	749
Meetings and Discussions	751
The Cardiff Engineering Exhibition	754
Correspondence: Liability for Consumers' Installations; A Counterblast to "Mr. Therm"; The I.E.E. Regulations; Dangerous Appliances; Commutator Mica; Chairman of the Board	755
Electricity in Factories	756
New Apparatus and Devices	757
Better Demonstrators. By V. Hindlip Vale	759
Electrical Development by "Talkies"	760
Business and Industrial Notes	762
Electricity Supply	766
Traction	767
Communications	768
Contract Information	769
Notes	770
Our Personal Column	771
New Companies	772
Returns of Electrical Companies	773
City Notes	773
Published Specifications	775
New Work for Contractors	776

Differential Tariffs

THE Electricity Supply Bill, the fate of which was prematurely reported recently in the lay Press, entered upon its second reading yesterday in the House of Commons, after being passed by the Lords. This Bill, which is being opposed by eighty-nine undertakings, contains two main provisions: one relates to direct grid supply for railways, upon which we commented in our issue of November 2nd, and which is now criticised by the Federation of British Industries; the other would empower the Central Board to supply undertakings owning non-selected stations (which might be operated by the Board) with energy on terms differing from the published general grid tariffs.

The object of this part of the Bill is presumably to obviate difficulties arising out of Sections 19 and 20 of the 1882 Act, which prohibit the giving of undue preference in price to one consumer over another. This was a proper requirement for the lighting loads then contemplated, but its inelasticity hampered the building up of the industrial loads that came later.

Thus, if an undertaking, in order to secure the substitution of an electric motor for a heavy-oil engine drive, has to cut its price, is it to quote the same rate to the less progressive owner of a non-condensing steam engine, with the same estimated consumption and load factor, who would be satisfied if the figure were three times as much? Strictly it should do so, as the terms offered must not be personal to the user, but must be related to the costs of the supply; also the rates to all existing consumers should be reduced to the lower level.

If this procedure had always been followed by the power companies in the past, consumers with the more efficient plant installed would not have been able to buy electricity, and the loss of their load would have necessitated the charging of higher prices to the other consumers. Fortunately, many (some of them curious) reasons could be introduced to constitute "differences," and special agreements with consumers were not divulged. Moreover, the permitted classification of consumers into different trades introduced some flexibility into tariffs.

The Central Electricity Board may be regarded as a large power company, but having its arrangements with its consumers very much in the limelight, and supplying only one class of load on published terms that must be applicable to a wide diversity of conditions of the user. This has emphasised the inadequacy of the old statutory restrictions to modern conditions which call for the consideration of the economics of both sides, *i.e.*, consumption as well as supply.

It is important to note that an arrangement regarding the operation of a station can be entered into only by agreement with the undertaking and with the consent of the Electricity Commissioners, and that charges for energy must not involve the Board in financial loss. There appears to be no provision in the Bill to review such arrangements from time to time, and some check of this kind should have been included.

If the power companies had been given similar statutory authority in their early years to conduct their business on ordinary lines they would, in many cases, have been able to adopt a more enterprising policy in negotiating difficult supply agreements.

Chairman of the Board

THERE is still no official announcement regarding Sir Andrew Duncan's successor at the Central Board. Naturally enough everybody in electrical circles is talking about the matter, and some very emphatic views are being expressed regarding the type of man who should preside over a body of supreme importance to the electrical industry. Our editorial comments of last week have led to some discussion regarding the old question whether for a given post an engineer is better than a man of affairs. We did not wish to raise that issue, but we find a very pronounced opinion that the new chairman should be a man of affairs with marked gifts of organisation, but, of course, preferably one coupling with these a know-

ledge of the electricity supply industry. Another view is that a widely experienced electrical engineer who has latterly demonstrated his ability to handle affairs in a broadminded way, yet with abundant energy, enterprise and initiative, would fill the bill equally well. We see no justification for the attitude that the new chairman must be a great engineer, any more than we see reason in suggestions that a man widely experienced in political and other public affairs is just the man for the job. The work that lies before the Board compels us to place a premium upon fitness—political influence or a desire to confer honours will not find us the man to make a success of electricity supply in Britain.

The E.D.A. Films

ON Wednesday last week the anxiously awaited propaganda films produced by the Electrical Development Association were shown to an audience consisting mainly of electrical men—and women. They were vigorously applauded, and the impression might have been gained that they were an unqualified success. Later, however, we heard a number of adverse criticisms—particularly of the film "Well I Never!" It must be admitted that if this film is judged from the angle of the borough electrical engineer—or his wife—it is full of shortcomings. The principal character is a futile sort of creature, and electricity is made to work miracles. The dialogue, too, is rather weak. But should the film be viewed from this standpoint? Is not the point whether it will appeal to the very ordinary housewife of the lower middle or working classes all over the country? We can only suggest that the test of the film's value is its actual exhibition to the people for whom it is designed. The other two pictures are on a higher plane—and here captious critics have complained that it is too high, while others question the wisdom of spending £13,000 of E.D.A.'s income in this way, and yet others wonder whether that gas explosion was desirable.

Preventing Accidents

ALTHOUGH the kWh sold has increased two and a half times and the number of factories one and two-third times during the past ten years, the total number of electrical accidents in 1933 was somewhat less than the average for the decade. Yet voltages are higher, a.c. is replacing d.c., and short-circuits tend to become more explosive in their effects. For the improvement much credit is due to the practical nature of the Home Office Regulations and to the promptitude with which manufacturers have met the needs of new conditions as they have arisen. In his report on electrical accidents (which is conveniently published separately from the main H.O. report), Mr. H. W. Swann, the electrical inspector, points out that to prevent an increase in the figure a steady acceleration in the improvement of safety features and appliances is essential. His report contains useful constructive criticism of existing apparatus, and also refers to tests being carried out under working conditions on British miniature earth-leakage trips operating on 30 mA or less, which should add materially to safety in the use of electricity.

The Insull Acquittal

SAMUEL INSULL, the well-known power supply authority, of Chicago and London, was on Saturday last found not guilty of the main charge brought against him of using the mails with intent to defraud. Many of his friends have declared all along that the great collapse of his electrical interests would not have occurred if there had been no general slump, or if that slump could have been foreseen. He fled before the pursuance of ruthless political interests anxious for a head on a charger to mollify a multitude who believed him responsible for their own and other people's losses. Be these things as they may, after a trial lasting eight weeks the case which took the American authorities two years to prepare has been settled by the Chicago jury in two hours' consultation, and Insull and sixteen others have been acquitted. Other Middle-West security charges are pending, but there is uncertainty as to what will happen, as there is a disposition to regard the Chicago decision as a precedent. Mr. Insull, who is seventy-five years of age, considers last Saturday's result as the beginning of his vindication. Stranger things have happened in this world than for the U.S. President to avail himself of the experience of this veteran of power organisation in the formulation of the new national power policy, in search of which his emissaries recently visited these shores!

Fair Trading

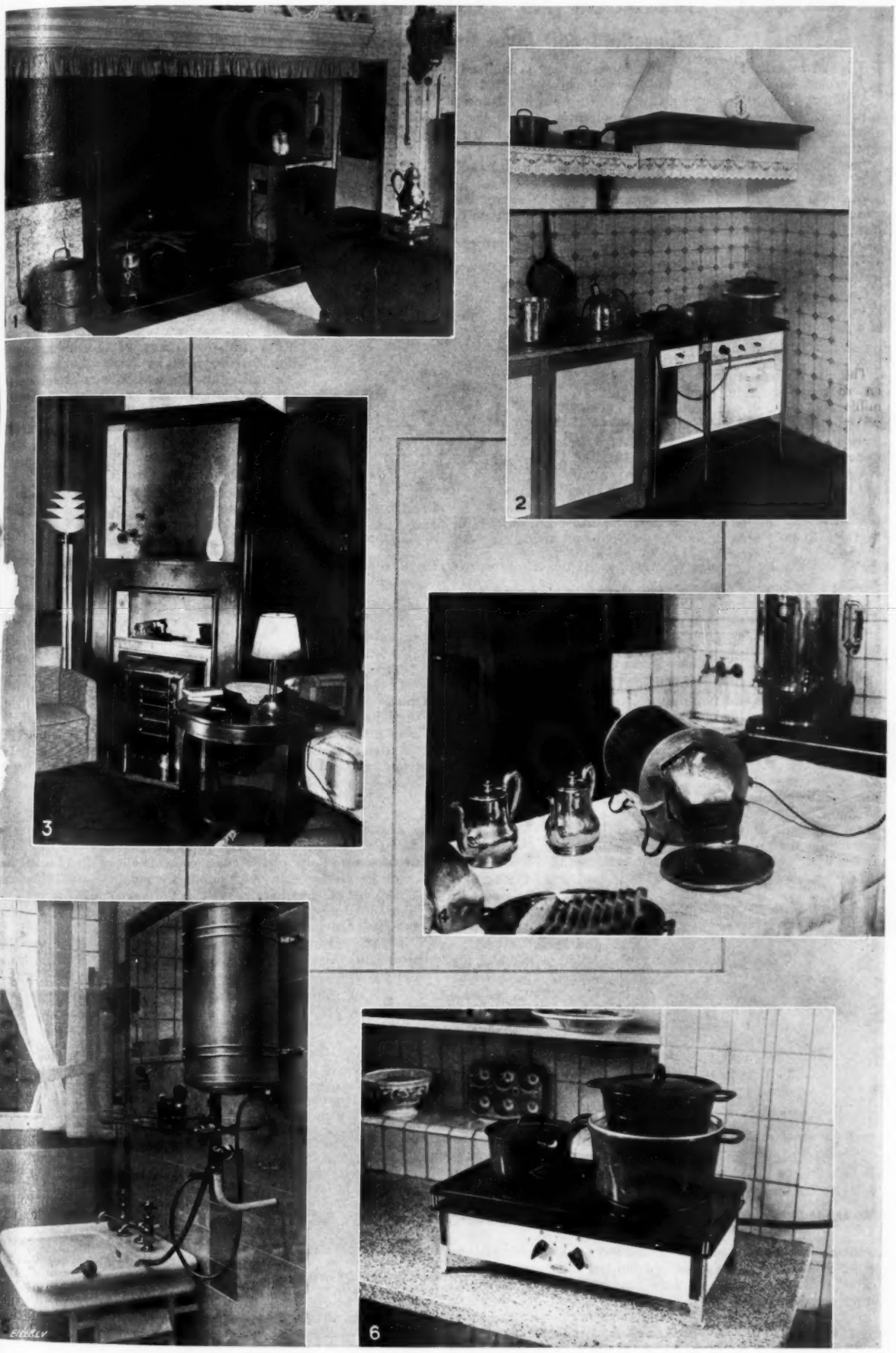
THERE are no thrills contained in the first annual report of the Electrical Fair Trading Council. It tells of deliberations that have taken place on such matters as general principles, organisation and development, and of eleven meetings of the General Purposes Committee, but it also makes it clear that until a number of points with reference to schedules and discounts have been agreed the Policy cannot be put into operation. Hope springs eternal in the human breast, and it is also expressed here that a satisfactory settlement of points outstanding between the I.M.E.A. and the Council will be reached early in the New Year. Power company organisations, too, may be coming into line, for they are considering the question of becoming adherents, while those too-little-appreciated ironmongers who have electrical departments have been knocking at the door with a request for representation on the Council, which request is receiving attention. Schedules have been prepared by a number of manufacturing groups, and they are awaiting Council's approval; others, too, are being drawn up. When giving full particulars of the Policy in the ELECTRICAL REVIEW of January 26th, 1934 (p. 127), we stated that over 2,000 acceptances had been received. The report now before us, and dated September, intimates that hundreds of additional firms have signed the official acceptance form to put the Policy into operation when the date is fixed.

Waiting to See

THE Council observes definite indications of general satisfaction within the industry that a Fair Trading Policy is shortly to come into operation. It is felt that some of the important non-association firms who have not actually signed, though they are substantially in agreement, are holding back because they wish first to see the plan working smoothly. An up-to-date printed copy of the Policy is available, and we note that the classification in Schedule I now provides for the "special large buyer," and defines him as: "Any person or persons, company or firm, whose name is to be included in a list to be prepared." Could door be wider open than that? In our reference to the scheme in January last we remarked that the Council had a long row to hoe, and that its duties during the first twelve months would be onerous and full of difficulty. Hard work is being put into that long row, but there are so many important points to receive attention that we incline to say for "first" twelve months read "second."

What is a Demonstrator?

THE answer to this question is not so simple as would appear. Not everyone with the "gift of the gab" is entitled to use the term—in fact people with this as their sole qualification are apt rather to irritate than convince the "prospect." Again good looks may attract, but they require to be backed by something more substantial to hold the attention of an audience. In this issue Mr. V. H. Vale shows that intelligence and proper training are the prime essentials in the make-up of a demonstrator; he suggests what that training should be and where it may be obtained. We commend his article to the attention both of those who employ demonstrators and to aspirants to demonstrators' positions.



The Metamorphosis of the Dutch Interior. **(See next page)**

1 The Dutch kitchen as it was. 2. And as it is now. 3. A modern lounge. 4. A bread-renewing oven. 5. An over-the-basin water heater. 6. A "lightning" cooker (this presumably refers to the speed of operation).

Modern Methods in Holland. By Nina Dyson Rayner

Household and farm tasks performed electrically

UNTIL recently I imagined that house-keeping in Holland would be quaint and decidedly old-fashioned. Now I know differently, for in many ways they are in advance of their English neighbours. Quite small cottages have electrical accessories of the diminutive type, and adequate electric lighting.

Practically 95 per cent. of the population of Holland can obtain electricity for power and lighting. Of the 1,078 municipalities 935 are supplied with electricity, and the aggregate capacity of the generators and dynamos reaches approximately 736,000 kW, while over 1,800 million kWh of energy is produced annually. As coal costs an equal price all over the country, due to it having to be transported everywhere by water, engineers consider it advisable to have a number of small power stations instead of a few large ones.

Mrs. N. Dyson Rayner

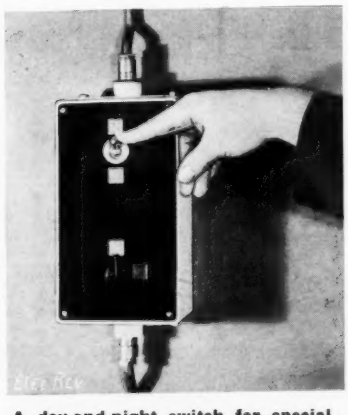
Town Consumers

The city of Amsterdam, which is not built on rock or concrete foundations but on millions of piles driven deep into mud and water, has approximately 210,000 dwelling-houses and practically all are connected to the electricity supply. The majority (135,000) are supplied under the fixed rate tariff, and the remainder under the simple rate. By far the greater number using the simple rate are provided with prepayment meters. These are also to be found in houses supplied on the fixed rate tariff, and also the so-called double tariff and summer household rate, which was only introduced just over a year ago.

Electricity is available to consumers on a three-part tariff. An annual rental, based on the size of the house, is charged, plus 1d. per kWh, except from 11 p.m. until 7 a.m., when ½d. per kWh only is charged.

Facilities for the Farmer

For agricultural and horticultural purposes ½d. per kWh is charged, with no additional rental. Electricity is much used for milking, sheep-shearing, pig-feeding, egg-testing, brooders and incubators. Fruit, which is required to be ready for an early market, is aided in growth by automatically controlled electric heating cables, which keep the soil at an even temperature. Strawberries, cucumbers, grapes, &c., find their way to the English shops and so provide a profitable source of income for the Dutch people. Two-fifths of the vegetables, flower and fruit produce of Holland is exported. Agriculture and cattle breeding occupy about 70 per cent. of the total area of the country, and the bulb fields in and around Haarlem, Lisse and Hillegom are real acres of delight in April, May and June.



A day-and-night switch for special tariffs

Before the war the women who lived in the country villages had a hard life. They had to get up each morning at least an hour earlier than the townswomen to clean their peculiar cooking range, and to light the fires. Breakfast was cooked by either the light of a smoky lamp or guttering candles. The lives of these women were occupied in performing household tasks with the maximum amount of drudgery and the minimum ease. The farm, where so many delightful blooms were grown, called for every minute of their time which could be spared from domestic work.

Types of Electrical Appliances

To-day countrywomen are able to improve their life and extend their interests beyond the limits of the family by the invaluable help which electricity affords them. They still rise early, but electric service saves many minutes. Light is available everywhere; the electric cooker has the breakfast ready in a few minutes, and a radiator provides warmth.

Most of the electric kettles used in kitchens are of a peculiar shape and plug in to the cooker itself. The washing machines are not as neat as those manufactured in Britain, but they are very effective. The motor is usually rated at 200 W, and the heating elements at 1,200 W. Storage water cisterns are rapidly becoming popular, and at the end of 1933 in Amsterdam, no fewer than 25,702 had been hired out, and 8,207 sold by the electricity authorities, in addition to those supplied by contractors.

The average yearly consumption of energy for these appliances is estimated as follows:—Water-heaters: 6-litre, more than 500 kWh; 40-litre, more than 1,300 kWh; 80-litre, more than 2,000 kWh; 150-litre, 2,500-3,000 kWh; 250-litre, 3,500-4,000 kWh. (The equivalent of 6 litres is 10½ pints; 250 litres is about 55 gal.)

The two smaller sizes are destined for kitchen use, but many of the 40-litre size have been installed for shower-baths, sometimes in conjunction with a complete shower-bath installation, and sometimes without. The larger sizes are installed in bathrooms.

About 135,000 electric stoves had been fixed in houses in the capital of Holland by the end of last year, and the average consumption per kW of stove capacity is about 200 kWh yearly. Electric radiators are used for additional heating, many of the houses being equipped with central heating.

It is estimated that about 80 per cent. of the fixed rate users have electric flat-irons and vacuum cleaners. In houses of quite a modest size the occupants often have a wide variety of electrical appliances, such as electric kettles, lightning cookers, chafing dishes, hair-dryers, toasters (known as toasting grillers), electric clocks, milk-boilers, tea-lights (small warming-plates on which to place the tea-pot) and thermo-taps.

Some of the electrical accessories are quite novel. A bread-renewing oven is used for making stale bread palatable. This small oven is switched on for about 10 to 15 minutes, then turned off. The loaf, which has been moistened all round, is now put in the disconnected oven, and in about another 10 minutes it is taken out in a renewed state, almost equal to freshly baked bread. The capacity of the oven is 600 W. The business man is catered for by the 40-W electric foot-warmer.

Electricity in Schools

Electric tramways, laid on or beside the carriage-ways, connect the villages with the main cities, enabling the residents to take advantage of the educational facilities there. In the domestic science schools all pupils are taught some theoretical knowledge of electricity as well as a knowledge of its applications. Older people are encouraged to attend evening lectures for guidance in electrical cookery.

I am indebted to the engineer and manager of the Gemeente Electriciteitswerpen, Amsterdam, for the photographs accompanying this article.

A New Insulating Material

A NEW type of electrical insulation called "Laytex," manufactured by the United States Rubber Co., is claimed to be the most flexible of all insulations, to have the highest tensile strength and resistance to compression, and the highest dielectric strength and insulation resistance. It therefore permits thinner but superior "walls," which in certain applications make possible a reduction of 25 per cent. in the outside diameter and 50 per cent. in the weight of the conductor. "Laytex" is derived directly from latex, the milk of the rubber tree. It is a non-coagulated, non-milled dielectric, purified to remove proteins, sugars and water solubles. It is maintained in its natural liquid state until the very last manufacturing process, which converts it into a solid dielectric, uniformerly applied upon a conductor by the dip and pass method, which consists of running a conductor through a series of liquid baths. Mechanical tests show "Laytex" to have a tensile strength of 5,000 lb. per sq. in., an elongation at rupture of 750 per cent., and a set in a 2-in. gauge length of ¼ in. With a tensile strength approaching that of a non-flexible insulation, it may be possible to adapt it to service conditions where metallic coverings are now necessary. Electrical tests show that it has a dielectric strength of 800 V per mil; an insulation resistance constant K=54,000, in the formula $R = K \log_{10} D/d$, where R is the insulation resistance in megohms per 1,000 feet, D is the diameter over the insulation, and d is the diameter of the copper conductor. The amount of moisture absorbed after soaking in water, as determined by the change in permittivity, is very low.

Village Street Lighting: Comments, Procedure, and Costs

By W. A. Turnbull and A. Logan

TO the stranger whose business takes him into a typical English village after dusk much sympathy is due. He may be seeking the home of a friend or business associate, guided only by piercing narrow shafts of light escaping from the cottage windows. Helplessness overtakes him as he stumbles along precarious footpaths hedged on one side with a mud-bottomed ditch to which, like a golfer approaching a bunker, he ultimately becomes prey.

With facilities for street lighting available, namely, poles and electricity, to which must be added a few swan-neck brackets, a time switch and galvanised iron switch wire, here, then, is surely business for the asking! But this is not so. As a first step to obtaining village street lighting business the borough electrical engineer and manager circulates to all chairmen of parish councils within the area a letter such as the following:—

Above: In the village of Bierton. Left: A meet of hounds in Bierton. Right: Lighting in Aldbury village

PUBLIC STREET LIGHTING.

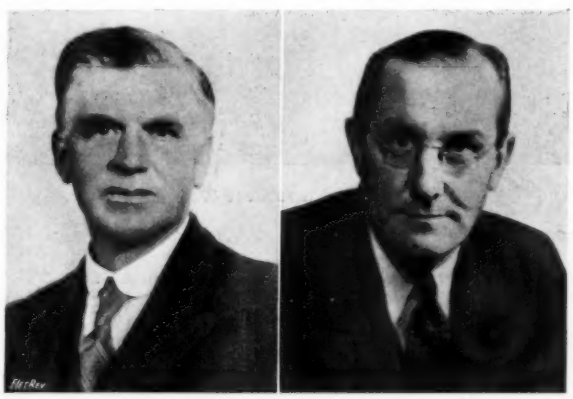
Since the electricity supply is available for street lighting in the parish which comes under the jurisdiction of your Council, I would respectfully ask you to give this matter your consideration. The rates which are in operation for street lighting are very economical.

In order to assist you in coming to a favourable decision, I would be prepared to fix an experimental street fitting for your inspection so that your Council and the parishioners you represent may have the opportunity of realising its importance as a means of increasing the amenities of the village after dusk.

The services of this Department are available to draw up a street lighting scheme and to offer your Council any advice on the matter.

In due course the letter is placed for consideration before the parish "headmen," at which the Department's representative submits his scheme.

Alterations are then suggested by the local experts who on such occasions spring up like mushrooms. After the scheme has been fully debated and weighed in the balance against impending sewage and water schemes, it is decided to put the matter before a full meeting of the parishioners.



Mr. W. A. Turnbull is borough electrical engineer of Aylesbury and Mr. A. Logan (right) is his sales superintendent

A fourteen days' notice for such a meeting is posted on the public notice board in the porch of the village church, but the Department, to assure a well-attended and spirited meeting, supplement this poster notice by issuing, by hand, twenty-four hours before the actual meeting, a twelve-line notice in bold type, such as the following:—

ELECTRIC STREET LIGHTING.—A Public Meeting will be held in the Schoolroom to-night, Thursday, March 1st, at 7.30 p.m., to decide this urgent necessity.

Councillor ———, Chairman of the ——— Electricity Department will be present.

Attend this meeting and cast your vote so as to assure the requisite two-thirds majority.

Such meetings usually take place in the village schoolroom, but on one occasion the drawing room of a local enthusiast was commandeered.

The attendances are usually very good, as apart from the business on hand the local rate (a popular and thorny topic in village life) will also come under discussion. The start is usually late—a murmur of anticipation runs through the assembly as the chairman, with dignity borrowed for the occasion, opens the meeting with a few words in the local vernacular.

The parish clerk reads out the business on hand, detailed below, and the chairman declares the meeting open for discussion:—

IN THE MATTER OF THE LIGHTING AND WATCHING ACT, 1833, AND WITH A VIEW TO THE LIGHTING OF THE STREETS, ROADS, AND PUBLIC PLACES IN THE PART OF THE PARISH KNOWN AS ———.

NOTICE IS HEREBY GIVEN that a Meeting of Local Government Electors for the part of the parish known as ——— will be held at The Schools on Thursday, the 1st day of March, 1934, at 7.30 o'clock in the evening, for the following purposes:—

(1) To consider the adoption by the Meeting of the provisions of the Lighting and Watching Act, 1833, for that part of the Parish of ———, known as ———,

(2) To fix the amount of money to be raised during the ensuing year for the purpose of the Act.

(3) To pass such further resolution as the Meeting may consider necessary or desirable.

Dated this —— day of ———, 1934.

Signed, ———,
Chairman of the ———
Parish Council.

The Local Government Electors for the part of the Parish of ———, known as ———, present at this Meeting DO HEREBY RESOLVE

(1) that the provisions of the Lighting and Watching Act, 1833, be and the same are hereby adopted for that part of the parish of ——— known as ———.

(2) that the sum of £20 be raised during the ensuing year for the purposes of the Act.

Quietly at first discussion centres round the probable increase in the local rate, followed sharply by independent views on the proposed positions of the lamps. Successive speakers argue for and against each other according to their respective social relationships. Occasionally a local inhabitant will

vociferate until red in the face and, with a parting voluble salute, leave the meeting.

At last the chairman asks for silence, which incidentally seems heavenly after the preceding babble and a public benefactor with a few well-chosen words proposes that items 1 and 2 be adopted; a seconder quickly follows, a majority is obtained, and the meeting is over. Eventually the fittings go up and the lamps are switched on.

Economy in capital cost and efficiency in operation is the fundamental basis of street lighting—particularly so in villages where the area to be illuminated against revenue return is not so favourable as in towns. The type of fitting adopted in the Aylesbury area consists of an 18-in. bracket clamped to existing poles, fitted with 60-W lamps and mirror-directional reflectors. The complete unit is supplied and fitted at an all-in price of £2 10s. per annum, which includes an astronomical time switch, lamp renewals, painting, weekly inspections, and the running of an independent switch wire. The charge for a 100-W lamp installed in a similar manner is £3 per annum.

From experience the capital cost per lamp is £5 10s. 6d., including bracket, lamp, time switch and switch-wire, which at 8½ per cent. gives 9s. 3d. per lamp per annum. The 1933 costs per kW for electricity at Aylesbury were: grid £3 5s., plant and sub-station £2 3s., h.v. transmission £1 14s., transformer £0.07, and, last, £2 18s. to cover showrooms, publicity, &c.; total, £9 2s. per kW. The l.v. distribution cost of £7 per kW is not included since the switch-wire is allowed for in the capital cost per lamp. The grid unit price of 0.21d. is increased to 0.44d. due to drop and other allocations. We thus get the annual cost per 60-W lamp as follows:—

	s.	d.
Capital cost of equipment	9	3
60-W. at £9 2s. per kW.	11	5
1,440 hours at 0.44d. per kWh.	3	0
Repairs (actual experience)...	6	6
L.V. portion of management and rates	1	8
Annual cost per 60-W. lamp	£1	11 10
Annual cost per 100-W. lamp	£2	1 10

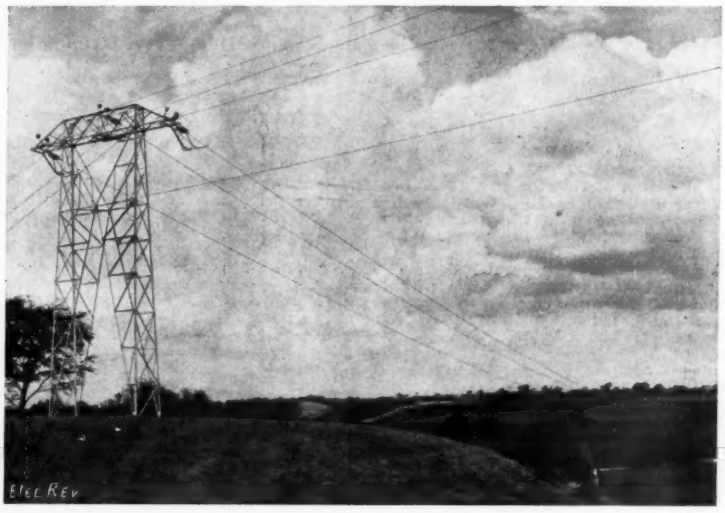
Although the charges made are respectively £2 10s. and £3 it must be remembered that the use of the existing poles and neutral wire is not included in the above costs, nor is the service cost per consumer included, which at Aylesbury averages £1 8s. per annum.

The Weaver Valley Span

THE 33-kV ring main of the Mid-Cheshire Electricity Supply Co., Ltd., crosses the Weaver Valley, which is over half a mile wide, at Wallerscote, near Northwich. Owing to projected works in the valley it has been necessary to move and reposition about one mile of line.

An underground route being found impracticable the engineer of the company (Mr. W. Fennell, M.I.E.E.) investigated the possibility of an overhead crossing at a point about half a mile down stream from the existing crossing. The selected route crosses the Winnington to Owley Wood road, the River Weaver, a h.v. line supplying a fairly extensive rural area, the Weaver navigation, and an important P.O. telephone line. The main conditions laid down were a minimum clearance of 70 ft. over the navigation and 30 ft. over a proposed embankment on the works site.

Schemes for a division of the valley crossing into two or three spans were rejected on account of the excessive height of towers and other difficulties. Although the length of a single span is 2,140 ft., the configuration of the ground made it possible to place the crossing towers at a point about 65 ft. above the river and the navigation, and so keep the tower height moderate. It was therefore decided to construct a single-span crossing.



The 2,140-ft. span across the Weaver Valley

Finding a Suitable Conductor

The next step was to find a conductor that would give the most economical combination of weight, sag and area exposed to wind loading, while withstanding the atmospheric conditions in a valley which is subject to air laden with sea spray. The final choice was a .075 sq. in. copper equivalent steel cored copper conductor specially designed by the contractors in collaboration with the Whitecross Co., Ltd., Warrington. It is made up as follows:—18/.0705 in. dia. hard drawn copper strands round 19/.0705 in. dia. galvanised hard drawn steel strands (ultimate strength 115 tons/sq. in.). The physical constants of this conductor are:—Diameter, .497 in.; weight per ft., .5409 lb.; virtual combined modulus of elasticity (E)= 23.13×10^6 lb./sq. in.; virtual combined coefficient of expansion (α)=7.468×10^{-6} per degree F.; ultimate strength=20,348 lb.

The high value of E and low value of α indicate a conductor of small variation in sag with change of loading or temperature. The corresponding values for a .075 sq. in. s.c.a. conductor used on the secondary lines of the C.E.B. are: E=12.49×10^6 lb./sq. in. and $\alpha=10.74\times10^{-6}$ per degree F.

It was decided to string this span to the Electricity Commissioners' standard loading, but to provide a safety factor of 2½ instead of the minimum of 2.

The maximum sag at 122 deg. F. in still air is approximately 80 ft. The minimum at 22 deg. F. without ice is approximately 73 ft., *i.e.*, a variation between extreme conditions of only 7 ft. The corresponding variation on a similar span for the s.c.a. conductor would be about 10 ft. 6 in.

On the north side of the crossing span the tower carries a small angle (at greatly reduced tension) on to the terminal support of a wood pole line, while the other (south) tower carries an angle of 68 deg. and a span of 1,000 ft. to a steel tower. These adjacent spans are fitted with earth wires below the line conductors, no earth wire being provided in the long span. The conductors and earth wire in the adjacent spans are .075 sq. in. steel cored copper (8/.109 round 7/.060 steel) with an ultimate strength of 9,100 lb. The conditions made it impossible to follow the usual practice of fitting suspension insulators on the long span towers anchoring the special conductor at strain towers of normal height (*e.g.*, Thames crossing).

It was necessary to make the long span supports of sufficient strength to be used as section towers. The factor of safety in the long span being greater than that in the shorter spans adjacent, it was thought advisable to allow for the possibility of all four wires in the spans leading away from the crossing being broken at once.

The disposition of conductors in the crossing span was finally arranged for a horizontal spacing of 45 ft. and a vertical spacing of 6 ft., the top conductor being placed centrally. In order to avoid excessively overhung crossarms the latter are rectangular, stayed against the pull of the crossing span, and self-supporting against transverse loads. The dimensions of the towers are as follows:—Height to lowest conductors, 75 ft. 3 in.; overall height, 81 ft. 3 in.; base dimension, 30 ft. by 10 ft.; top dimension, 25 ft. by 3 ft.

The towers, &c., were designed by Messrs. Watshams, Ltd., in consultation with Mr. Fennell, and constructed by J. Parks & Son, constructional engineers, Northwich. The special span conductors were prepared by the Whitecross Co., Ltd., Warrington. Steatite & Porcelain Products, Ltd., supplied the suspension insulators, supporting fittings, arcing horns and clamps.

The following are the technical details of each set:—Two strings of four insulator units (type S:325) in parallel (dry flash-over value 300 kV, wet flash-over value 235 kV). The ultimate strength of the conductor is 20,348 lb., and of each insulator string 28,000 lb. There is thus an insulator factor of safety of about 2½ under conditions of breakage of the conductor and a working factor of safety of about 5½.

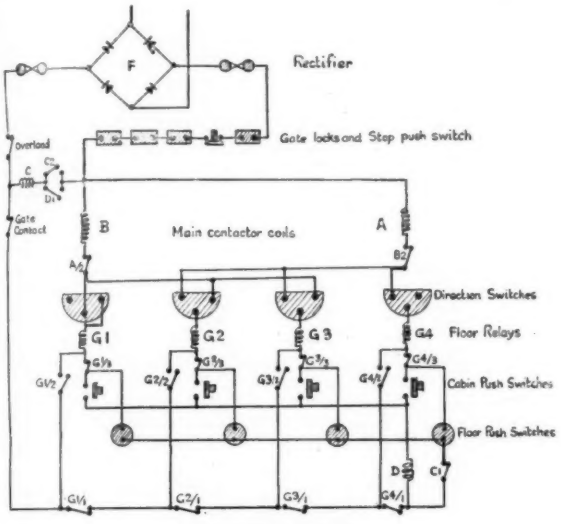
The whole of the work on the crossing and the adjacent diversion was carried out by Messrs. Watshams, Ltd., under the supervision of the Mid-Cheshire Co.'s engineers.

The A.C. Lift Controller. By W. Woodiwiss, A.M.I.E.E.

How it operates

IN recent years the electric passenger lift has been installed in stores of smaller pretensions than formerly because of the prestige it has given to the premises and comfort to the customers, and the greater floor space which it has made available. In city blocks of storied flats, suites of offices, and multi-floor garages, its use is rapidly extending, while the small electric service lift is becoming common in hotels, cafés and stores.

The lift operates under severe conditions. It is repeatedly starting and stopping, generally under load; it must accelerate and decelerate quickly; and it must be capable of continuous



The control circuits

service. The satisfactory operation of the lift is largely due to the controller.

For a three-phase squirrel-cage induction motor the usual circuit comprises: a triple-pole switch and fuses; a time limit overload trip coil; the main limit switch; and the reversing line contactors.

Should the lift tend to overrun the top or bottom floors the limit switch cuts off the supply to the motor. It may be operated by a striker on the lift cabin operating a stop fixed to an endless rope which passes over sheaves at the top and bottom of the lift shaft. When the cabin travels beyond its prescribed limits it strikes the stop, moving the rope and rotating the sheaves, one of which opens the limit switch.

The reversing line contactors reverse the connection of the two supply lines to the motor and reverse its rotation. If the motor were of the slip-ring type, contactors fitted with time delays would be used to short-circuit the rotor resistance. The coils of these would be energised through relay switches closed by either of the main reversing contactors. The resistance contactors would also operate relay switches in the coils of the main reversing contactors, so that, if they remained closed owing to some mechanical fault, neither of the latter could be energised.

The control circuit illustrated comprises a rectifier for giving a d.c. supply to the control circuit; operating coils for the supply line contactors; safety relay switches comprising gate-locks, car-gate contact, overload; circuit interlock relays; and push-button control circuit.

It is now standard practice to fit rectifiers with a.c. lift control circuits. It is found that the d.c. contactors give more satisfactory service than a.c. ones: they are free from hum; they do give not a pulsating but an even contact pressure; if the contactor armature does not go right home there is no tendency for the contactor coil to be damaged by excess current.

With the elimination of the push-button control circuits and the completion of the circuits of the main contactor coils by a two-way switch situated in the cabin, the diagram would represent the main features of the manually controlled lift.

Push-button Control

In response to a call the lift, if at rest at an intermediate floor and all the well gates are closed, must travel either up or down, stopping automatically at the call floor. When it has started its journey subsequent push calls must be ignored until it has delivered its passengers. The principal features of the control circuit are push-buttons in the car, floor call push-buttons, floor relays, direction switches and non-interference relays. The floor relays are usually situated at the bottom of the control panel and are energised by either push or call switches completing the circuit to either of the main contactor operating coils.

The direction switches are two-way switches situated in the lift well, one at each floor. During its ascent the striker on the lift cabin knocks over a striker arm on the direction switches and so prepares the control circuits for down travel. During its descent the striker knocks over the arm and prepares the control circuit for up travel.

By operating the appropriate direction switch the corresponding floor relay switch is de-energised and the main contactor coil circuit is opened so that the lift stops at the required floor.

Before a new lift is tested the equipment as a whole will be examined to ensure that grease (or oil) has been put into the gearbox, the guides have been lubricated, belts and nuts are tight and the lift well and winding gear is clear of erectors' batons and tools. The lift well gates will be closed, the brake checked for correct operation, and the lift will be operated manually by the handle that fits on to the motor shaft to make sure that all is clear. The operation of the limit switch can be checked whilst this is being done.

Inspections will be made of the controller to see that all contactor armatures are free, the contactor switches for good contact, the wiring of the fuses, the tightness of the connections to the terminal blocks, and the oil in the dash pots on time delay contactors. The circuits will then be tested for insulation resistance to earth and for continuity.

The continuity of the earth-

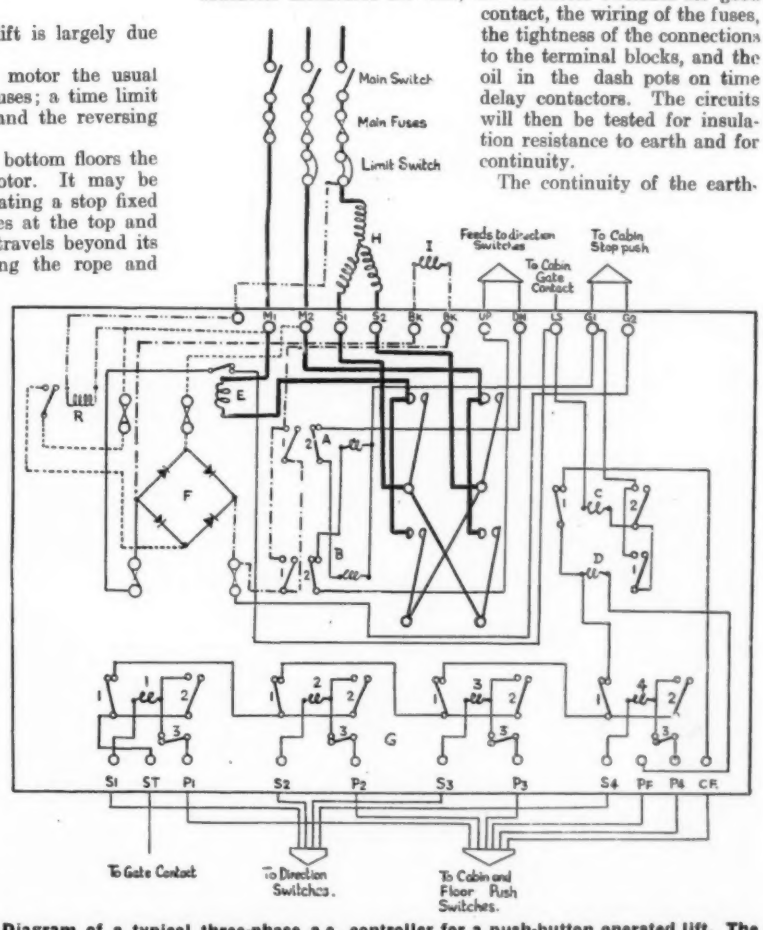
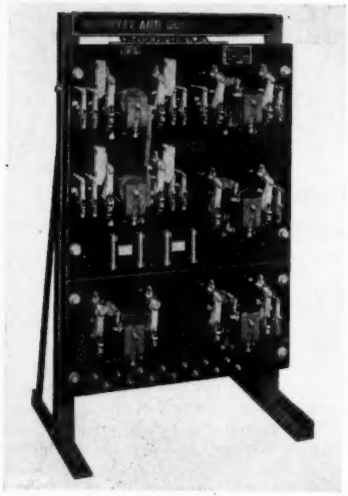


Diagram of a typical three-phase a.c. controller for a push-button operated lift. The principal components are indicated as follows:—A and B, main reversing contactors; C and D, non-interference relays; E, overload relay; F, rectifier; G, floor relays; H, motor stator; I, brake solenoid; R, phase failure relay



A lift controller

ing of the various components will be checked. This is important in connection with gate locks. If the earthing is not well carried out faults may develop on the circuit and cut out some or all of the locks so that the lift would operate with the gates open. One of the gate contacts should be earthed and the main power switch closed; this ought to operate the control circuit fuse. The gate locks should also be inspected to make certain that they do not make contact before the gate is in the locked position.

The lift can now be run for one hour each at no load, half load, and full load. The temperature rise of the motor, bearings and contactor coils will be noted, and the contactor switches examined for "pitting." The lift will be stalled by disconnecting the brake and operating the controller to see that the overload time limit functions properly. The lift will be overrun at each end of its travel to check the operation of the limit switches.

Maintenance of the Controller

Important requisites in the controller are: Contactors of robust design; massive main power contacts which will reduce temperature rise and can be easily refaced if "pitted"; easily renewable main power and relay contacts; each relay contactor arm renewable without interfering with the others; readily adjustable time delays; fixed contacts fitted to a solid post capable of standing the repeated blows of the contactors when closing; contactors of similar size to reduce spare parts to a minimum; and accessibility.

The control panel should be enclosed in a sheet-steel cubicle to keep it free from dust and grit. A varnished diagram of connections should be pasted on the door of the cubicle.

With a good type of controller situated in a dry, well-ventilated room little maintenance is required, but regular inspection of contact tips and connections is important.

Maintenance is often facilitated if a plug socket for a hand lamp is installed near the controller. It is also a good plan to have a box at hand in which a few necessary spares can be kept, such as contact tips, fuse wire, and, if used, carbon brushes for the motor, and a sheet of emery cloth.

The E.I.B.A. Ball

THE ball given on November 22nd in aid of the funds of the Electrical Industries Benevolent Association was more enjoyable even than its predecessors—that is if the opinions we heard expressed among the 320 guests that assembled at Grosvenor House were truly representative of the whole, as we believe they were. There was only one flaw in the scheme of things, and that was the news that the President, Lord Ashfield, could not be present owing to indisposition. Lady Ashfield, however, attended to receive the guests in company with Sir Wm. Ray, who deputised for the President.

Dancing started promptly at 8.30 p.m. and was terminated at 2 a.m., with obvious reluctance by some 150 people who still held the floor. Among the tunes "plugged" by the orchestra was the theme song for the new E.D.A. publicity film "Plenty of Time for Play," which was announced as Sir William Ray's "signature tune," thus supporting the view that hard work is by no means incompatible with healthy recreation.

Speeches were made at supper by Sir William Ray, Lady Ashfield, and Mr. E. E. Sharp (chairman of the executive committee), but these occupied only about three minutes in the aggregate. The usual penny collection was taken. Cabaret items were interspersed among the dances. Although these included such popular turns as Clapham and Dwyer, Leonard Henry, and Bailey and Cummings, probably the most appreciated item was the song rendered by Mrs. Hoadley, the wife of the I.M.E.A. President.

1. A dance ends. 2. Mr. and Mrs. R. P. Sloan and Mr. and Miss Marryat. 3. Mr. Dixon, Miss Pat Farina, Mr. H. Lingard, Mrs. Boyle Lawrence, Mr. G. E. Riley, Mrs. Mills, Mr. E. A. Mills, Mrs. Lingard, and Miss Vandermin. 4. Mr. E. E. Sharp (Chairman of the Executive Committee) and Mrs. Sharp, Sir William Ray, Lady Ashfield and Capt. J. T. Keeping

A New Architectural Lamp

A NEW type of architectural lamp is being introduced into this country. It is a filament tubular lamp suitable for general architectural lighting and for constructing advertising signs in groups of letters, &c. A particular advantage is that it can be produced in much greater lengths than is usual—about 7 ft. on 220 V.

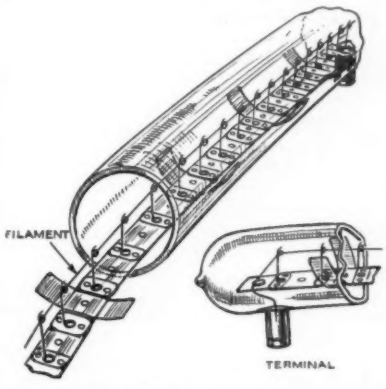
The lamp comprises a glass tube of any diameter from about ¾ in. to 4 in., into which, to support the filament, a flexible chain of insulating material is introduced. This chain consists of small pieces of mica about ¼ in. wide and 1 in. long linked together to form a flexible chain which adapts itself to the contours of the glass tube. One girl can produce about 30 ft. of chain, complete with the molybdenum wire supports (pigtail) per hour on a small hand machine. Sixteen employés can produce approximately 2,500 ft. of "mica" tubes per week, and the manufacturing costs average only 2s. per 2-ft. length. In the earlier stages of development it was feared that, owing to the vacuum and the comparatively high temperature in the tubes, the mica would be liable to release gases. It has been found, however, that after a simple initial treatment of the mica no gas release whatsoever occurs during the whole life of the tubes.

In another method of construction even the molybdenum pigtails are dispensed with and replaced by pieces of mica. The mica is transparent, and thus no shadows are cast.

The main advantages claimed for this, as compared with other tubular lamps, are that it can be made in greater lengths; its simplicity of construction; the actual glass part of the lamp is the envelope only, the possibility of breakage being thus materially reduced as no glass rods or glass beads are mounted in the interior of the tube; and there are no shadows in the lamp. The lamp has been on the Continental market since the beginning of 1933, and it has met with considerable success. It is made under the Perrin & Vinzant patent and is being handled in this country by Dr. S. P. Rety, 39, Victoria Street, S.W.1.

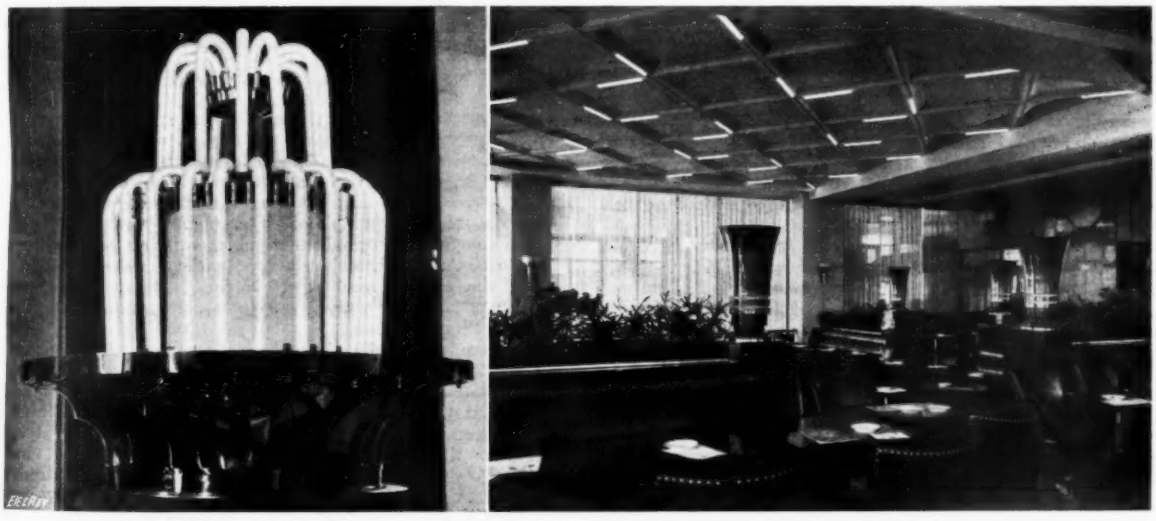
to be only about one-fifth of the cost of a sign constructed with neon tubing, while the luminous efficiency of a "mica" sign is much higher; moreover, there is no need for complicated h.v. wiring, safety switches, or backgrounds. Tubes are available in loadings of from 40 W to 140 W per 2-ft. length, and a range of letters covering the alphabet has also been put on the market, all the letters being constructed from about a dozen standard component parts. The life of the "mica" tube is about that of an ordinary vacuum tungsten filament lamp, and the tubes are available in clear and white or coloured opal glass.

Some installations include a fountain as at the Etablissement Dupont, Paris, in which clear lamps have been utilised with a view to obtaining the effect of water by the visible mica chains. A 40-ft. outdoor sign erected at the Salon des Artistes Decorateurs in the Champs Elysées Paris, was so effective that from a distance of about 30 yd. it could not have been distinguished from neon, apart from its greater brilliancy.



Diagrams showing the construction of the "mica" tubular filament lamp

The Etablissement Marignan in the Champs Elysées is



A fountain at the Etablissement Dupont (left) and architectural lighting in the Etablissement Marignan

The red variety of the tube is said to be particularly suitable for use in place of neon equipment, since the initial cost of a sign constructed with lamps with the mica-supported filament, including the cost of erection and wiring, is claimed

equipped with about 3,000 "mica" lamps for general architectural illumination, while in the Café de la Ville de Meaux (Gare de l'Est, Paris) a very long continuous lighting effect is obtained without discernible joints.

Water Heating and Electrolysis. By Eric Chisholm

MANY electrical engineers interested in the installation of water heaters, especially immersion heaters used on "conversion" jobs, have commented on the peculiar chemical action which takes place when the hot-water storage tank and the pipes connected to it are of different metals. In some cases this action has been so definite as to cause concern. This concern is not confined to the electrical industry, as I know of one case where thin-gauge galvanised-iron tanks were used with copper pipes connected to a usual type of domestic boiler system (not electric), and within a year the builder was forced to replace the iron tanks with copper tanks.

The action is, in my opinion, probably electrolytic. The order of the elements in the electrochemical series is the order in which the elements displace one another from their salts, and the further the elements are apart in the series, the greater the electrolytic action produced. The action is accelerated if heat is applied during the process.

Iron railings are often fixed in a bed of lead: the iron corrodes first and leaves the lead intact. Davy tried to prevent the corrosion of the copper sheathing of boats by fixing sheets of metallic zinc here and there on the sheathing; the zinc was corroded and the copper preserved. It has been suggested that one metal is "sacrificed" to save the other. Both cases are examples of galvanic couples.

Any metal can be made one plate of a cell against a metal lower down in the series, *e.g.*, zinc (iron covered with a thin protecting layer of zinc is known as galvanised iron) can be made the positive plate against the negative plate of tin, lead or copper. The further apart the elements are in the electrochemical series, the greater the e.m.f. of the combination.

To apply this to a practical case it is not unusual to find a tank of iron-coated zinc, piping of copper, and an immersion heater of copper-coated tin. The combination of the copper and zinc (galvanised iron) is, I suggest, the cause of rapid

deterioration of the tank. The tinning of the immersion heater and thermostat has probably little to do with failure in this case.

Kettles fitted with immersion heaters also provide an interesting study for the engineer. Whilst in charge of the repair department of a supply undertaking I noticed that the bodies of aluminium kettles fitted with tinned copper immersion heaters sometimes developed copper pits, although in every case the element windings were tested to their metal casings for insulation resistance and found to be thoroughly satisfactory. It was noticed, however, that in all cases the tinning on the elements had been damaged by consumers, giving a "far apart" electrochemical combination, aluminium-copper, which obviously caused the electrolytic deposit of the copper on the aluminium.

Even before the rightly stringent 1934 I.E.E. Regulations (see 1002 (b)), regarding the bonding of pipes, tanks, &c., in bathrooms were introduced it was suggested that if the action was electrolytic it could be prevented by a metallic connection, but this obviously is not the solution to the difficulty. A thermo-junction of the copper-constantin couple type, used in measuring instruments, is a case in point. In this instance the dissimilar metals are welded or soldered together at their point of intersection; yet a current is generated, small though it may be.

If it were permissible to *insulate* the pipes and heaters from the tank the action would not take place. This, however, is definitely neither safe nor practicable. The only safe and ideal arrangement is to have the same metal, say, copper, for all the components of the installation.

Making Cooker Switches

A RECENT visit to the new factory at Ealing of Arrow Electric Switches, Ltd., afforded us an idea of the intricate processes involved in this rather specialised section of the electrical industry. Metal parts are stamped out and plated actually in the factory, and the switches are built into high-grade British porcelain supplied by Messrs. Taylor Tunnicliff & Co., Ltd. The construction of the switches is such that dependable performance is to a large extent based on the complete accuracy of the porcelain as well as all the metal parts.

In starting the assembly of the standard cooker switch the porcelain base is first gauged to make sure that the numerous heights and locating platforms in the porcelain are all in exact accordance with the specified dimensions, and in this operation the porcelain is gauged strictly to very fine limits. The switch blade unit, with its special quality extra heavy phosphor-bronze blades, is assembled over a hub encased in bakelite insulation with heavy linen fabric bakelite barriers between the upper and lower blades.

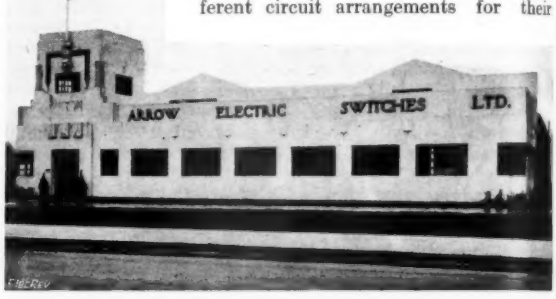
When the switch centre has been put together and subjected to an electrical test of 2,500 V to earth, it is gauged and inspected and the amount of spring tension on the blades is checked by special fixtures. The distance between the blades is also adjusted so as to conform in all respects to the heights of the upper and lower contacts which are mounted on the porcelain. Therefore, with the porcelain heights definitely determined and the distances between the blades of the switch assembly verified, the blade assembly will revolve through the contacts of the switch with equal pressure on the top and bottom blades, thus minimising excessive wear and heating of metal parts.

The cam mechanism calls for a good deal of attention, but its success is due to a large extent to its simplicity. It is operated by a true cam movement without ratchet gears, and is made of case-hardened steel of special design. The spindle and spring assembly which permits the reciprocating action is an exclusive feature; the spring is constructed of fine high tempered steel wire and is of one piece, wound in two directions.

In assembling the parts special fixtures and multiple electric screwdrivers are used, although each screw is finally tightened by hand. Final inspection of the switch is very rigid and adjustments are made to ensure that the action is free and that the switch operates properly as to load carrying capacity and circuit arrangement. The switch handles are also made in the factory, and each one is tested on the switch before it is packed.

We saw an elaborate testing board of the company's own construction for determining that all switches dispatched are up to their fully rated load capacity and arranged to operate in the proper sequence of circuit control.

Single-pole, series-parallel switches are used generally by most cooker manufacturers, but we were told that the company is producing over forty different circuit arrangements for their various sizes of rotary switches. The general construction of the reciprocating switches is the same throughout the line, which ranges from a small switch on a 2-in. base, rated at 3 A, 250 V, up to large high-capacity switches on 4-in. bases, rated at 35 A, 250 V. The same production and assembly methods are used throughout this range.



The Arrow rotary-switch factory

The company also produces tumbler switches ranging from 3 A to 30 A, 250 V, and in a wide variety of designs. Here again the electric screwdriver is used extensively and we saw some ingenious assembly fixtures used for mounting the very small mechanisms.

We were interested in the method of waxing and filling holes in porcelain base switches from an electrically heated melting pot operated by a foot trip device. An asphalt base black tar preparation is used, for it holds satisfactorily under extreme heat and cold conditions, while it is not affected by steam or the usual climatic changes, and has been found after many years of use specially suitable to the extreme conditions under which cooker switches are sometimes required to operate.

The assembly benches (left) and the test room

Evidence of the importance attached to the accuracy of the component parts is also abundant in the well-equipped tool room.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

The Training of Boiler House Employés

AT an informal meeting of the INSTITUTE OF FUEL in London on November 22nd, Mr. John Bruce, boiler house superintendent at the Barking power station, opened a discussion on this subject by expressing the view that the designation "fireman" or "stoker" was wrong and entirely out of keeping with the skill required in, and the responsibility attached to, the work of this grade of employé. A more fitting and comprehensive description would be "boiler house operator." In the same way the designation "trimmer" was now misleading and no longer applicable.

Notwithstanding that the modern boiler unit was now an assembly of machinery necessitating highly skilled operation, the sources from which the necessary labour was recruited remained very much the same as they were twenty-five or even fifty years ago. At the same time, even though boiler plant had developed to such a degree, it still remained a type of machine extremely susceptible to the effect of the human element in the control of its performance. Yet not one of the grades of labour was officially recognised as a skilled trade necessitating a definite form of training or apprenticeship. Even in the case of the highest grade of employé only a proportion could be considered up to the standard required for modern plant.

The problem of drafting a common course of technical and practical instruction was not so simple as at first sight it might appear. Actually it divided itself into three parts: (*a*) raising the standard of ability of the employés at present engaged in the higher grades of boiler-house work by means of definite technical instruction courses; (*b*) drafting a course for technical instruction in the grades auxiliary to that of fireman (or boiler operator) to fit them for higher grade duties; and (*c*) drafting a course of technical instruction and practical training for young men taking up such employment.

In the case of larger plant the management might consider it an investment to provide the means and the method whereby men could be trained. To ensure attendance it would be necessary to pay the men for the time occupied at the classes, and a scheme of this nature had much to recommend it since the tution could be connected very intimately with the actual plant which the men would be operating.

To train men in the lower grades for promotion to the higher grades would necessitate radical alterations to existing practice, and the type and duration of the training would require very careful consideration.

The discussion being an informal one, some candid views were expressed. It was emphasised, for instance, that unless those entering this class of employment had good prospects of becoming boiler-house superintendents or assistant superintendents, it was too much to expect, say, a qualified chemical engineer to enter upon such work. Therefore it was not thought possible by many speakers that the highest type of intellect could be attracted to this work. It was agreed, also, that there must be a grading of the type of work to be undertaken relative to the size of the plant.

A great deal, however, was made of the fact that there were stringent regulations in other countries which prohibited a man being engaged in operating boiler plant until he had obtained his certificate in one grade or another. Training at college with actual employment on boiler plant, it was suggested, would do more than any school alone could do.

The Performance of Diesel-engine Generators

THE performance of heavy-oil engines as recorded on log sheets is the subject of the paper by Mr. W. A. Tookey which was read before the DIESEL ENGINE USERS' ASSOCIATION in London on November 21st.

The author correlates and compares test-bed and industrial performances of modern high-compression airless-injection heavy-oil engines working under dissimilar conditions of service. The installations considered all generate electricity, some for working factory plant and others for public supply. In the former case the satisfactory correspondence of "test" and "operating" figures indicates that actual industrial performance is quite in accord with the best test-bed results.

In public supply stations conditions may vary but little from those in industrial service when supplies from the grid minimise the load fluctuations of the engine-driven sets. The author's charts indicate very clearly the difference between the rates of fuel-oil consumption during short and long runs. Longer periods are decidedly better, and until working temperatures are attained the higher efficiencies cannot be expected. Therefore the general conclusions which the Association's published "Working Costs" represent must be utilised with discrimination; generalisation may cloak facts.

The general results are of the order of from 0.6 to 0.65 lb. of fuel oil per kWh generated. They illustrate the fact that whether heavy-oil engines are at work abroad or at home, whether in industrial or public electricity supply service, though of different sizes and types of construction they can operate within close limits in respect of kWh of electricity generated per unit of fuel consumption. For example, for a consumption of 200 gallons the number of kWh generated is between 2,790 and 2,950, a difference of just over 5¼ per cent. In industrial service for an output of 3,800 kWh per 8-hour shift, the test results would point to a consumption of 234.5 gallons and the actual consumption for the same output, according to logged results, was 240 gallons, a difference of 2¼ per cent.

The conclusion is warranted, the author states, that the generalisations inseparable from the preparation of the Association's annual "Working Costs" are sometimes used, intentionally or heedlessly, in a manner which obscures the excellent working results achieved from modern oil engine installations.

Potentialities of the Country Consumer

THE inaugural address of the chairman, Mr. R. Borlase Matthews, to the recently formed Transmission Section of the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 21st was illustrated by lantern slides and sound-films, this being the first occasion on which the new I.E.E. cinematograph installation was used.

To-day, the speaker said, over 6,000 farms were using electricity, consuming just over 6 million kWh, but he did not

A fire, the cause of which is unknown, broke out in the E.L.M.A. Lighting Service Bureau in the I.E.E. building on Friday last. Two rooms were involved and the contents were considerably damaged. We reproduce above "before and after" pictures of one of the apartments

consider that number large for 395,800 farms and holdings were at present using mechanical power equivalent to 286 million kWh per annum, plus another 233 million kWh in the form of animal power and exclusive of the power used in farmhouses.

The rural population of 227 areas for which rural distribution powers had been granted was about 8,000,000 (practically 85 per cent. of the total inhabitants of country districts). Out of these there were not quite 400,000 consumers, who used 100 million kWh. In the factories in rural districts over 400 million kWh was consumed; while 90 per cent. of the consumers were domestic they only consumed 25 per cent. of the electricity. If only all the present rural demand for power were electrical, it would amount to 2,147 million kWh per annum.

On the average British farm the consumption was under 10 kWh per acre. On the Continent it was 35 kWh per acre and in very fertile regions it might be as much as 100 kWh per acre. In England there was an average of four farms per mile of roadway. It paid to electrify a farm when one-fourth of the land was arable or where a dairy herd was maintained.

A British Standard Specification for ferro-concrete poles was in draft form and should be of great assistance. Ferro-concrete foot mountings for wooden poles should do much to reduce costs and facilitate replacements. Over a million of these footings were in use in France alone.

The Electricity Commissioners often adopted a broader point of view as regarded rules and regulations than did many of the electricity supply undertakings. In fact if the industry had been more of one mind the Commissioners would have granted even further concessions. The Transmission Section Committee already had in hand the consideration of existing regulations. A copy of the specification prepared by the late Overhead Lines Association for standard outdoor transformers suitable for suburban and rural development would shortly be sent to every member of the new I.E.E. Transmission Section for amendment or approval. The object was to take up the matter where the British Standard Specification (No. 171) stopped. The aim had been to bridge the gap between the maker and the user, for the benefit of both.

Having standardised transformers, the question arose whether it would not be advantageous to standardise other features of overhead line construction, several aspects of which offered considerable scope for research.

Rural Electrification

While the scope of the Section's work would cover all branches of the transmission and distribution industry, one branch in particular which should benefit greatly by its work was rural electrification. Taking the country as a whole it should prove remunerative at the present time to provide supplies to from 60 to 70 per cent. of the rural areas in the country. The minimum size which would carry the necessary overhead charges, as a general rule, should have a population of at least one hundred and twenty thousand to justify its development as a separate undertaking.

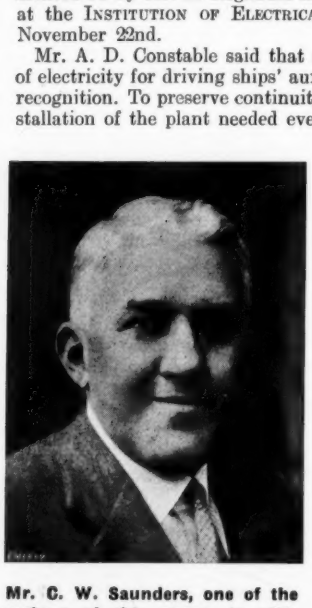
Some rural schemes in operation to-day showed that by far the largest proportion of consumers were domestic and that the bulk of the energy sold was taken by factories, works, &c., on the outskirts of towns. This seemed to indicate that those in charge of the schemes had been primarily concerned with the industrial and residential possibilities of the areas, the farm load, if any, obtained, being a secondary consideration.

The address concluded with details of the Mid-Lincolnshire electrification scheme, and a description of a new thermal storage water heater for country districts in which piped water supplies were not available.

Electricity on Board Ship

THE paper on the generation, distribution, and uses of electricity on board merchant ships, by Messrs. C. W. Saunders, H. W. Wilson and R. G. Jakeman, which was commented on by Mr. A. Regnauld in our last issue, was discussed at the INSTITUTION OF ELECTRICAL ENGINEERS in London on November 22nd.

Mr. A. D. Constable said that after a hard fight the merits of electricity for driving ships' auxiliaries now received general recognition. To preserve continuity of supply the layout and installation of the plant needed even more careful consideration than in the case of land installations. So far as maintenance was concerned, well designed gear was best left alone, subject to periodic overhaul. Pipe ventilated and enclosed motors were specified by the Admiralty. In some recent instances the limit had been reached with d.c. distribution; the advantages of a.c. distribution should be studied more fully. Contactor control gear was not liked in warships.



Mr. C. W. Saunders, one of the authors of this paper, is with the General Electric Co., Ltd.

Although benefits could be derived from centralisation, good switchgear needed little supervision. Group starting seemed attractive, but involved more complication in switchgear and connections. In the past cable faults had represented the major troubles; much better insulation was now used, but finality had by no means been reached, and the total weight of the cables used in a ship was still considerable. Every possible precaution should be taken to avoid risk of fire, and the layout of cable runs should be planned at a very early stage in the design of the ship. There were possibilities of so grouping turbo-alternators as to shorten the pipe runs and enable higher steam pressures and temperatures to be employed, leading to fuel economies and other advantages that might be worth while even if the first cost were to be greater. He believed that all-electric plant could be designed in this country for a ship of the size of the *Queen Mary* which would be more economical than the conventional type.

Mr. G. O. Watson said the authors had tried to cover too much and therefore had to omit most important details. He found few bones to pick, but no mention had been made of Diesel-electric a.c., the use of which should be more fully considered. To prevent moisture condensation in idle machinery he would prefer to pass a small current through the windings and keep air circulating rather than fit exterior heaters. Central control only permitted one machine to be started at once, and therefore might cause delay after a total shut-down. Accessibility should be the keynote. There was urgent need for a certified class of electrician for ship work.

Dr. C. C. Garrard remarked that the modesty of the authors had added to the value of the paper. Too much enthusiasm was often harmful when dealing with marine engineers. In any case it was bad salesmanship to decry one's competitors. The overload capacity of electrical ships improved their "making-up," and had enabled them to keep to their scheduled speeds in bad weather. He favoured automatic control and also electric propulsion, which would come. The amortisation period allowed for land cables was longer than for any other electrical plant. Why was it different on ships? Was it due to the manner in which the cables were installed? The provision of alternative mechanical operation for contactor gear was unnecessary and should be done away with for simplicity; it suggested unreliability which did not really exist.

Dr. W. G. Thompson considered that a.c. auxiliary plant should receive more consideration. The use of exhaust-heat donkey boilers had been shown to be too costly; d.c. plant occupied too much room. The power used and maintenance required by electric steering gear made it preferable to steam gear.

Dr. S. Whitehead suggested that impedance voltage drop might be increased if cables were run on bulkheads, but such runs were usually quite short. Cables should be run close to bulkheads, but widely separated. To prevent bulkheads heating where cables passed through them a small non-magnetic gland should suffice.

Mr. A. C. Hardy thought the paper differed from most on the same subject because it was so friendly. The marine industry had engineering hopes of its own which it naturally liked to fill when new orders came along, but the marine engineer realised that electricity was something which he could no longer do without. The fight had been fierce, but there was hope for the future.

Mr. H. W. Beara stressed the fact that indicating instruments were now available which showed the power supplied by the shaft. True data were available for the first time which shipbuilders should consider very carefully. Discrimination between essential and non-essential circuits had proved extremely useful. He would not favour centralised control, but preferred to separate things in the engine room. Regarding cable faults, it should be realised that a ship was "alive" and "flexing" all the time and by no means so rigid as a land installation. Ships' electricians had very great responsibility, and it was time the Board of Trade gave them a definite status.

Mr. C. H. Chase suggested that batteries lent themselves very readily to numerous applications on board ship. There had been a recent move to use them for emergency services.

and on cargo ships batteries were being used for port lighting when the main plant was shut down.

Mr. W. McClelland stated that he had been on board each of the ships mentioned by the authors and could state that they were all satisfactory and highly economical. When at sea he preferred steam-driven auxiliaries augmented by Diesels; his long experience of high-speed Diesels showed them to be costly in maintenance and other respects. He liked Ward-Leonard control for heavy duties. The Admiralty's extensive experience of that method proved it to be really reliable and satisfactory. Plural starting was only advantageous when a number of motors could be closely grouped together. The saving in space and weight claimed for it was doubtful. Steering gear was vital; therefore the standby motor should be fed from an entirely separate source. Also ball bearings should not be fitted to machinery subjected to vibration and intermittent use; under such conditions the balls developed flats.

Dr. R. G. Jakeman, in a brief reply, said he was not sure that a.c. would be as satisfactory as d.c. for auxiliary drives. The application of internal heat to prevent condensation would complicate switchgear. Instruments were now available which gave real records of the power used at sea and so enabled architects to verify tank tests. He agreed that ball bearings should not be subjected to vibration and intermittent use.

Electric Railway Signalling

THE power signalling installation of the Great Western Railway Co. at Paddington is described in the paper by Mr. P. G. Jacobs which was read before the London Students' Section of the INSTITUTION OF ELECTRICAL ENGINEERS on November 27th.

This all-electric system is operated from three frames with 184, 96 and 88 levers, respectively. Continuous track circuiting has been provided throughout the area, the movements of trains being indicated on illuminated diagrams in the box whose section they are in.

A.c. at 110 V is used for all mechanisms and controls other than for point-machine operation, for which 120 V d.c. is used. The normal supply is given from the railway company's Royal Oak sub-station at 460 V 50 cycles to each signal box, where it is transformed to 110 V; the emergency supply comes from the Metropolitan Electric Supply Co.'s mains at 200 V 50 cycles to Paddington Departure, where it is transformed to 460 V. The d.c. supply is given either from one of two trickle-charged batteries, one at Royal Oak and the other at Arrival, or from rectified a.c. at Royal Oak. Both a.c. and d.c. ring mains have been provided to guard against cable failure.

The frames in arrival and departure boxes are of the G.R.S. type "C," with levers of the pistol-grip pattern, handles being alternately upturned and down-turned. Mechanical interlocking has been used. An electric lock holds each lever in any required position when the lock coils are de-energised. Point levers are locked in "normal" and "reverse" positions, and all signals in the "normal indication" position; the track-controlled main-line signals are, in addition, locked in the "normal" position.

Approach locking ensures that while a train is approaching a signal, which has been "cleared" for it to proceed, no points ahead of that signal can be altered until the signal lever has been restored to the "normal indication" position (thus returning the signal to "danger") and left in this position for a certain fixed time-interval.

Back locking holds the route ahead of a train once the signal has been passed. Sectional locking ensures that while a train occupies a certain section of track, all point levers which control points conflicting on that section are locked "normal" or "reverse." Sectional release route locking maintains the route ahead of an approaching train once the signal for that route has been "cleared." As each section of the route is cleared by the train the route locking is released, thereby allowing another move to be made with the minimum of delay.

All points are operated by G.R.S. model 5A point machines, the motor being series-wound for 110 V d.c. Both tongues of all points and all facing-point bolt-locks are electrically detected, a.c. being used for this purpose. Three control wires are used for the operation, the same three wires having the a.c. detection superimposed on them.

Passenger signals are of the three-aspect "searchlight" type, two aspects only being used. They are replaced to "danger" by the first or second track circuit ahead, and cannot again be "cleared" until the lever has been put to "normal" and "reverse." They cannot "clear" unless points in the route to which they apply are correctly set, and all track circuits up to the next signal ahead are unoccupied.

* * *

Colliery Illumination

The increasing popularity of electricity for lighting purposes at British collieries was emphasised by Mr. W. Davies in the course of a lantern lecture on "Some Aspects of Underground Lighting," which was given at a recent meeting of the South Wales branch of the ASSOCIATION OF MINING ELECTRICAL ENGINEERS at Cardiff. Mr. Davies stated that in 1911 the number of electric lamps in use in the mines was only 4,298. By 1922 the total had risen to 294,593, as against 584,404 flame lamps. To-day the number of safety-lamps in use was 725,000, of which more than one-half were electric. Those figures proved that there was little doubt that the flame lamp would have been ousted almost entirely as a means of illumination but for the serious economic depression which had militated during the past ten years against the expenditure on the better type of lamp.

The Transmission Section Conversazione

ALTHOUGH so recently formed, the Transmission Section of the Institution of Electrical Engineers has already been described as "An institution within an institution." Nearly 2,000 applications for membership have been received and some 1,400 have been admitted.

Continuing the custom of the Overhead Lines Association, from which the Section has sprung, the annual conversazione and supper-dance was held at Harrods' Georgian Restaurant, Knightsbridge, on November 23rd.

The new sectional chairman, Mr. R. Borlase Matthews, with Mrs. Matthews and Miss Freda Matthews, received the 245 members and their ladies and guests, dancing being continued with an interval for supper until 1 a.m.

The function proved to be one of the most successful of the series so far held, and the customary exhibition of overhead-line gear which was contributed to by fifteen concerns, included Prof. R. M. Catterson-Smith's phase sequence and polyphase resonance demonstration apparatus. The other exhibitors were as follows:—*Bullers, Ltd.*, string insulators as used on the grid, a similar string of Hewlett insulators, pin insulators with spindles, a section of a pole carrying typical low-voltage gear, and a flash-over indicator for high and normal voltage lines.

Croydon Cable Works, Ltd., an overhead insulator cleaner and "Pernax" moulded hoods for protecting aerial contacts; also tubing and plastic tape for bird guarding.

Electrical Equipment & Carbon Co., Ltd., a range of "Maxim" line clamps and taps, bakelite shrouds, "Strangler" wire rope clips, and parallel groove clamps.

Enfield Cable Works, Ltd., sections and "telescoped" samples of 66-kV H.S.O. cable and pipe line, a specimen of 132-kV H.S.L. cable, 33-kV H-type cable, 10-kV rural cable, and 1,000-V distributor cable sectioned specimens.

Evershed & Vignoles, Ltd., "Meg" and "Megger" earth and insulation testing instruments, an instrument for measuring the electrostatic capacity of cables, &c., the Knowles-Shotter self-protecting leakage ammeter, and a "Megger" circuit-testing ohmmeter.

Ferranti, Ltd., a tail-end booster, moving coil and mercury switch regulators, a safe load indicator, and a surge generator and absorber with demonstration panel.

General Electric Co., Ltd., a new type of lightning arrestor and a recently designed h.v. liquid fuse for outdoor use (described on p. 685 of our November 16th issue).

Griffiths Bros. & Co. (London), Ltd., sample films of various kinds of special paints for protecting switchgear and substation structures.

Johnson & Phillips, Ltd., pole-mounted oil switch with automatic reclosing device, automatic pole-mounted switch-fuse, vertical tandem type air-break switch, ironclad l.v. switch-fuse with plug chamber, portable pole-mounted metering equipment and small line fittings.

Pirelli-General Cable Works, Ltd., samples of catenary cable and four types of cable.

Steatite & Porcelain Products, Ltd., a 44-kV transformer bushing, 11-kV tension insulators, insulators of spring-ring construction, 33-kV and 132-kV cylindrical insulators for isolating gear, and a model overhead line tower.

Switchgear & Equipment, Ltd., an 11-kV pull-down fuse isolator of new design (described on p. 721 of our November 23rd issue), which is self-aligning, with high-pressure outdoor switch contact and h.v. liquid fuse; also the Stockbridge vibration damper.

Taylor, Tunnicliff & Co., Ltd., cinematograph film showing the testing of insulators for the grid.

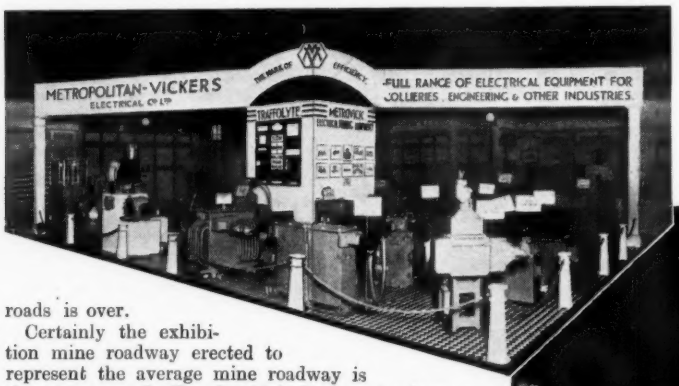
Greater Felcourt Co., 18-gallon thermal storage water heater of new design for rural areas without piped water supplies, which requires no plumbing and is claimed to cost about half the average. It is of the displacement type with no joints below the normal water level. The loading is 300 W.

The Cardiff Engineering Exhibition

A number of mining electrical exhibits

THE thirteenth Engineering Exhibition organised by the South Wales Institute of Engineers and held at the Greyfriars Hall, Cardiff (November 21st to December 1st) crystallises in a striking manner the great amount of research work in flame-proof electrical equipment that has been carried out by our large electrical concerns. While many of the stands are devoted almost entirely to mining equipment, there can also be seen many items related to the metal-producing industries of South Wales, chief of which is, of course, the tin-plate trade. Here again electricity has caused development to be proceeded with at a great pace and more and more, as better financial conditions are being brought about by increased business, rolling mills are turning to electricity as a motive power.

Mine lighting has also engaged the attention of research workers, and it seems as if the day of badly lighted mining roads is over.



Two stands at the Cardiff Engineering Exhibition which closes tomorrow (Saturday): Above, the Metropolitan-Vickers Electrical Co., Ltd. Below, The General Electric Co., Ltd.

Certainly the exhibition mine roadway erected to represent the average mine roadway is almost generously illuminated and serves to show what can be done by the scientific use of electricity as a mine illuminant.

The General Electric Co., Ltd., shows examples of flameproof portable mining sub-stations, flameproof lighting fittings, electrically vibrated screens, battery exploders, pedestal-mounted oil circuit-breakers, and flameproof barrel type motors. Other items are the company's supervisory control gear, which enables any number of sub-stations up to ten to be operated from a central point, and a portable coal-face lighting unit of flameproof construction throughout. The latter consists of a 5-kVA single-phase air-cooled transformer, having a ratio of 400/110 V, a double-pole high-voltage isolator with fuses, and a low-voltage air-break circuit-breaker with overload trips and shunt trip coil, together with protective relays and cable boxes. Skids are provided to facilitate transport and all fixing bolts are shrouded in accordance with Mining Regulations. The whole of the equipment is approved by the Mines Department for use in fiery mines.

A feature of the exhibit of the Metropolitan-Vickers Electrical Co., Ltd., is the Type "MU" mine drill units for use with Victor high-frequency drills. A rotary frequency changer is employed to give power for the drills at 110 V 150 cycles, which is novel inasmuch as it combines in a single machine the functions of a squirrel-cage driving motor and a generator which supplies the high-frequency low-voltage current for the utilisation of which the drill is designed. The control circuit of the drills is operated at a maximum of 25 V so that the personal safety of the operator is assured, exemption from flameproof regulations being secured at the same time.

Also shown are the "MU" units designed for roadway lighting in mines and consisting of 2.5-kVA units for circuits up to 3,300 primary volts and low-voltage units up to 660 primary volts. Both are supplied with normally two single-phase circuits at 110 V, and provision is made for mounting a small auxiliary unit on either of the larger units. Exhibited in conjunction with the above is the new flameproof master control switch of the push-pull type. There are also barrel-type mine motors which can be rolled along roadways to site on removal of bolted-on mounting barckets, an arc-welding equipment, and convevors and haulages, the last being complete with a liquid controller, reversing switch, and combined master switch and control lever.

Messrs. Gent & Co., Ltd., exhibit a range of their products, including "Tangent" mining apparatus with the latest type mining bells, arranged for operating in parallel or series, and certified relays for mine working in parallel or series. A novel exhibit is the "Tangent" fire alarm system which is superimposed on ordinary bell circuits and is operated by thermostats coupled to each bell push. When a thermostat in the circuit is in operation and the alarm is being given all the bell circuits are inoperative.

A number of electrical concerns and other firms interested in mining equipment have combined with the Coal Face Machinery Exhibitors' Association in erecting and equipping an exhibition coal mine, already referred to, and a large amount of electrical equipment has been lent by firms not members of the Association. The Electroflo Meters Co., Ltd., shows electrically operated meters for the measurement of steam, water, sewage, air, oil and gas, and automatic control pyrometers for the measurement and automatic control of temperatures of industrial oil, gas and electric furnaces.

Messrs. McWhirter & Sons, Ltd., exhibit examples of repair work to works and mine motors, and show an electrical trackless hare equipment for greyhound tracks, electrical machinery and coils of their manufacture and the public-address equipment with which the Exhibition is fitted. Messrs. Ferranti, Ltd., through their agents, Messrs. G. S. Mottram & Partners, Ltd., show surge absorbers, instruments, electric fires, integrating meters of various types, and test sets.

Philips Industrial have a range of oxide cathode rectifiers for battery charging and industrial purposes on their stand, which, on account of their flexibility, are particularly suitable for charging miners' lamps; and a d.c. welding rectifier. Cables for various uses and for all voltages and loads are shown by the Telegraph Construction and Maintenance Co., Ltd., and wires for broadcast relay work, public address and lead-in purposes are exhibited which are claimed to be highly resistant to chemicals and sea air, and completely moisture-proof.

The purpose of the exhibit of the British Oxygen Co., Ltd., is to demonstrate the methods and equipment which have influenced the use of the welding and cutting processes for major, as distinct from minor, requirements in the engineering industry. Small portable oxygen cutting machines enable visitors to assess the economy and speed of oxygen machining for the production of parts from steel plate (or forgings), and the joint use of welding and oxygen machining in production can be visualised.

Cheapening House Services in America

Service entrances for domestic premises (overhead conductors and internal cabling, meters and main fuses) cost the American Gas and Electric Co., New York, from $10 to $15 each in 1910, according to the *Edison Electric Institute Bulletin*. By 1929 the figures had risen to over $75, but this has now been reduced by about $20, partly due to the decrease in cost of materials but primarily as a result of improved engineering. A revision of the Code in 1930 permitted the elimination of fuses before the meters. The latter are now of the waterproof type erected on the external wall of the houses, which has necessitated the development of weather-proof and tamper-proof cable for use between the meter and the service pole. A bare-neutral conductor has been adopted for service entrance cables and is being used also for services.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Liability for Consumers' Installations

The authoritative and interesting article published in the ELECTRICAL REVIEW of November 23rd, under the above heading, leaves one wondering whether the seller of apparatus such as electric irons, kettles, &c., wired complete with twin flex and adaptor (or two-pin plug) would be deemed liable should the purchaser be injured through a defect developing later. Is it incumbent upon the seller—whether an electrician or unskilled salesman—to warn the purchaser that such apparatus, without provision for earthing, should only be used in rooms and situations having the required conditions for safety?

Again, what is the legal position of the contractor responsible for the installation of two-pin plugs in bathrooms, sculleries, or similar positions (or in sitting rooms where water radiators are subsequently installed), should the consumer afterwards purchase and connect apparatus to these plugs and sustain injury through an original or subsequent defect in the apparatus? Alternatively, would the seller of the apparatus be solely or—with the contractor for the original installation—jointly responsible?

As the I.E.E. Regulations are not enforceable, unless a condition of contract, it seems to be debatable whether or not two-pin plugs, and apparatus connected thereto, installed in various positions (and even in kitchens, &c.) could be styled defective installation work. Yet I note that "as a general rule the fact that a consumer without negligence on his part had received an injury from his electrical installation would be *prima facie* evidence that the installation was not safe, and, in the absence of strong rebutting evidence, would be sufficient to establish negligence, and, therefore, liability"—apparently on the installer's part.

There are many thousands of electric irons, kettles, portable fires, &c., connected to a public supply in use adjacent to gas stoves, water pipes, and in stone-floored rooms, without being earthed, and those like myself in close touch with consumers must wonder at the comparatively few accidents which result. I am convinced that if Mr. Thomas would kindly enlighten us further on the points that I have raised others would—like myself—be grateful. J. H. ROBINSON.

Croydon, *November 26th.*

It would appear from the article by Mr. J. W. Thomas that an installation contractor is on the horns of a dilemma should a condition of contract require compliance with the I.E.E. Regulations and the latter prove inadequate to prevent damage.

It would be interesting if Mr. Thomas would comment upon the following:—An earth fault on an electric cooker in the house of A caused a fire in the house of B in which there was no electricity supply. The cooker conformed with Regulation 1337 by provision of the suitable terminal to which an earth conductor "may" be connected. In addition the supply authority insisted on an actual earth connection being made to a water pipe. The fault caused a potential rise on the water pipe which made contact with a gas pipe in the house of B and caused the fire.

It should be pointed out that the fact that earthing is insisted upon by all authorities is an admission by them that all apparatus is liable to breakdown, and lack of provision for such breakdown would be negligence. In the instance quoted, the precaution against breakdown in the house of A caused damage to B. The contractor was compelled to make the earth connection and apparently is liable for the consequential damage.

Now B, who has suffered damage by the fire, will be anxious to know who is liable for the damage, so probably will claim against the water and gas authorities; the latter will promptly deny liability while having to admit the fact of the burned pipes. Certainly the electricity authority will be brought in but will argue that since no defect has developed on its cable system the fault must have been metered, therefore the consumer is liable. The consumer will hold the contractor liable for negligence, so the contractor will blame the cooker maker. The cooker maker will prove that the earth terminal was duly fitted to comply with Regulation 1337, but he cannot accept responsibility for anything that resulted if an actual earth connection were made. Possibly the consumer and contractor would argue that the supply authority was the culprit because a supply was refused until the earth connection was made.

The trouble would have been avoided if a leakage current trip were connected in the earth circuit, and arranged to open the main or cooker switch with a 10-A earth fault, but the contractor cannot admit that this should be done without also admitting negligence since no such switch was fitted (or obtainable). The Regulations say nothing about the matter provided the cooker load is less than 100 A. Apparently the contractor is to blame for not knowing better than to comply with the Regulations, but these are a condition of contract. The contractor might ask the Fire Offices Committee to obtain a good insurance policy for him; the latter body was represented on the Rules Committee anyway. A. G. BULLEN.

Liverpool, *November 26th.*

A Counterblast to "Mr. Therm"

May I suggest that the electrical industry goes one better than "Mr. Therm" by making a practical model of an electrical "mascot"? I have tried to illustrate a figure—"Mr. Unit"—that could be installed by any salesman or showroom manager and would lend itself admirably to neon display, besides being a simple subject for illustration.

In its simplest form it consists of a lamp for the head and v.i.r. or similar cable for the body and limbs; a step further

and the head can be a pearl lamp illuminated by current through the limbs, in each case the connection at the neck being hidden by a bow. Once made the model can be used for display in almost any attitude and is capable of attracting attention to any specialised article.

Perhaps from this, together with other suggestions, a suitable figure will emerge to fill this much-needed post.

CHAS. R. LOWN.

Stourport-on-Severn, *November 24th.*

The I.E.E. Regulations

Mr. A. G. Bullen, in his letter in your issue of November 23rd, suggests that the requirement of a 30-mA leakage trip "may discourage the use of electricity because of the high cost of apparatus." He then quotes certain prices.

We feel compelled to point out that the prices he mentions are much higher than those which actually obtain to-day. For example, a triple-pole circuit-breaker, complete in cast-iron case, with 30-mA leakage trip and two-pole overload release, can be purchased for about £3, whilst a similar circuit-breaker for a 50-A current may cost perhaps £8. On comparing these prices with those ruling for circuit-breakers without leakage trip, the extra involved will be seen to be a very moderate one.

EVERETT, EDGCUMBE & CO., LTD.

Hendon, N.W.9, *November 26th.*

Dangerous Appliances

It seems to be rather a coincidence that on the introduction of the new Wiring Rules an accident has received wide publicity owing to a successful action for damages. The article in this week's REVIEW by a barrister accentuates this, and one can only hope that the electrical industry will now give attention to abuses that have meant much loss to bona fide electrical traders in the past. I refer to the practice that is growing of the supplying of cheap and "dud" electrical goods by stores, small and big.

In December, 1932, a very big West End store advertised in the Press "1 kW and 2 kW stoves complete with flex and *lampholder adaptor.*" I took it upon myself to write to this

firm drawing attention to the danger of supplying goods to the public which if used in the way indicated by the "lamp-holder adaptor" would probably have serious consequences. I received an acknowledgment thanking me "for so generously pointing out this matter" and saying that "measures would be taken to ensure the apparatus being plainly marked 'for power circuit only.'"

I am satisfied I did the right thing, but the fact remains that here is a menace and an illustration of the dangers to which the public is exposed. I suggest that the supplying of electrical goods should be similar to that obtaining in chemists' shops and stores. A qualified electrician should be in attendance just as a qualified chemist is required by the law to be in attendance at drug stores. WILLIAM G. BROWN.

London, E.3, *November 23rd.*

Commutator Mica

Is not the common practice of undercutting commutator mica merely an expedient adopted by users of d.c. machines against a non-existent bogey?

My reason for raising this question is that in over twenty years' experience, which includes maintenance of the old copper-brush machines, I have never found a flush-turned commutator to be mica ridged. On the other hand, I have had every possible trouble on machines with undercut commutators, the chief sources being: (1) copper picking at commutator bar edges; (2) flashing round commutator through carbon dust; (3) excessive brush wear; (4) brush chatter; and (5) copper dust embedded in the brush surface.

What have the supporters of undercutting to say to this?

S. OSBORNE, Lieut., R.E.,

Quetta, *November 1st.* *Electrical Inspector in Baluchistan.*

Chairman of the Board

Referring to the leading article in your issue of November 23rd, may I express a hope that the Minister of Transport will appoint as successor to Sir Andrew Duncan a gentleman who has had a very full experience of electricity supply?

In my view it would be a great mistake to appoint a man because of his business, legal or political experience only. There are plenty of men in the electricity supply industry who not only have very great experience in electricity supply but whose business ability is second to none. It is futile to expect anyone, however capable, not trained in the industry to fully grasp the very special conditions which relate only to electricity supply.

Are all the leading men in the electricity supply industry so incapable that it is necessary to go outside to find men capable of filling the important well-paid jobs? Personally I very much doubt it. Would the legal or medical profession tolerate having laymen for chairmen? MANAGING ENGINEER.

November 23rd.

Electricity in Factories

THE number of electrical accidents reportable under the Factory Acts in 1933 numbered 346 (of which 25 were fatal) compared with the averages for the two previous five-year periods of 384 and 368, during which time the kWh sold by authorised undertakings increased from 4,339 million to 10,097 million and the number of factories covered by the Regulations from 72,820 to 122,288.

In his annual report "Electrical Accidents" (Stationery Office, 6d. net) Mr. H. W. Swann, the electrical inspector for the Factory Department, refers to accidents in places other than factories, including twenty-one fatalities on domestic premises, of which fourteen were due to portable apparatus, seven cases being in bathrooms.

The largest number of accidents in factories (131) happened at switchboards, often due to carelessness of skilled operators. Portable apparatus and flexibles came next (103), leading causes being inadequate maintenance of insulation of flexibles at the point of entry to portable apparatus and failure of the earth connection. There has been a marked increase in the use of small transformers (sometimes portable in insulated cases) to provide a low voltage for working in boilers or wet places.

Accidents with electrical machinery (20) were, in the main, due to adjusting or working at brush gear. Severe burns following a vapour explosion within an enclosed motor suggest the need to eliminate from windings all volatile matter by prolonged drying at a high temperature. Attention is drawn to the possible non-applicability of exemption from the Regulations after a change-over to a.c. by the supply undertaking.

In order to avoid the need for increasing clearances in outdoor sub-stations when the growth of load prevents the making dead of the busbars for maintenance, bare conductors have been replaced by cables which, with suitable screens, have made access possible to groups of circuits that can be treated as a "section." Some outdoor sub-stations are regarded as far too complicated, and attention is drawn to B.S.S. No. 162.

The substitution of bar-primary current transformers for those of the wound-primary type has enhanced the factor of safety under modern short-circuit conditions. In view of the limitations as to ratio range with the former, users should specify the secondary loading within closer limits with a view to lower V-A ratings, which would make it possible to use the bar-primary type. Lower ratios are also obtainable by the use of low-loss alloy in the cores and of special secondary windings, which in conjunction with modern relays afford satisfactory protection at low values of primary current. Current transformers with multi-turn primaries have been designed which possess a short-circuit factor that is dependent upon the duration of the fault and the permissible current density; the time delay of the protective devices, therefore, becomes very important. The short-circuit time element is also the significant factor in determining the success of a fuse-protected circuit-breaker, especially if reckoned on short-circuit. Even if the breaker is not required to open under short-circuit it is subject to the thermal and electromagnetic effects of the currents carried.

Limiting resistances are usually connected in series or incorporated with h.v. fuses, but less attention has been paid to m.v. switchboard instrument fuses, and severe explosions have occurred.

The time taken in clearing faults has been increased on many extensive systems, due to the protective gear having been installed to deal with a comparatively limited area or by increasing the time-setting of circuit-breaker releases in an endeavour to secure continuity of supply.

Low-resistance earths in rural areas (for the operating of protective-gear or for neutral-point earthing, especially for pole-mounted transformers) has been obtained by injecting brine solution at 60 lb. per sq. in. into the ground; in one case an earth-resistance of 300 ohms was reduced by six successive applications to 42 ohms, which remained almost steady for several months. The electrodes were 5 ft. by 2 in. galvanised perforated tubes.

Treatment of the area round the electrodes with water did not materially reduce the resistance, and when using brine the surface area of the electrode was unimportant, the electrolyte being the effective medium in reducing the resistance. For fire extinction, flooding with carbon-dioxide gas is reliable where the conflagration is confined and the floor-levels do not vary much. Water jets have been used to emulsify the oil and render it non-inflammable for both open and oil-filled h.v. apparatus.

The development of high-frequency furnaces of capacities up to 5 tons for refining has made impossible some of the safeguards previously employed, and special measures have been adopted. The use of 230 V a.c. (instead of 100 V) for arc refining has also introduced new risks to be guarded against.

The most frequent cause of ignition of flexible cables is badly constructed terminals and cord grips which cause short-circuits near the point of entry, and the use of gasfilled lamps of 100-W and over increases this risk. The time element is once more important, and in inflammable surroundings where d.c. is used tough-rubber covered cables are more satisfactory than silk and cotton.

The report concludes with comments on several typical accidents with various types of apparatus.

The I.E.E. Students' Ball

One of the difficulties in keeping together our younger electrical engineers is that at the age of twenty-eight they cease to be members of that promising group, the I.E.E. London Students' Section, over whom Mr. E. L. Hefferman presides this year with the help of Mr. W. E. Butler as hon. secretary. Thus one is sometimes disappointed to be told that So-and-so has "gone on" and therefore will not be present at one of the section functions. However, at the enjoyable dance held at the Victoria Hall on November 21st, which had been organised by Mr. H. J. Edwards, the hon. entertainments secretary, we were glad to find an unusually large leavening of "old boys," although we missed Mr. H. T. Young, the I.E.E. Council representative, who was prevented from being present by family illness.

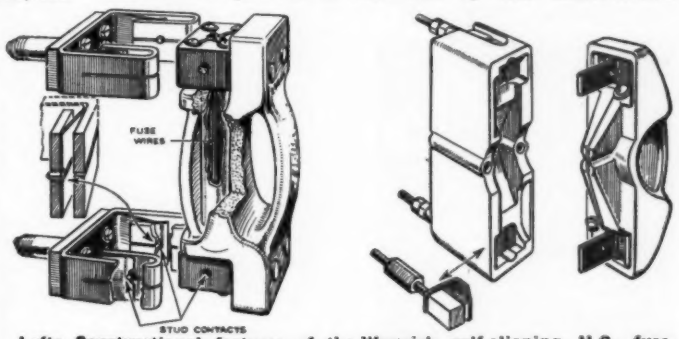
New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Fuse Equipment

An outstanding feature of the 5/15-A, 250-V and 500-V, "Warwick" fuse unit recently introduced by Messrs. WM. MCGEOCH & CO., LTD., Warwick Works, Coventry Road, Birmingham, 10, is the very long break afforded by the design of the handle and base. The contacts on the carrier are of h.c. copper of ample sectional and contact areas, and are arranged for easy wiring, while recessed in the base beside the terminal blocks are phosphor-bronze springs, which impart a constant pressure to the blades when they are inserted between these springs and the terminal blocks. All the metal parts are electrically tinned, and the bodies are of high-quality English porcelain, available in white or black glazed finish.

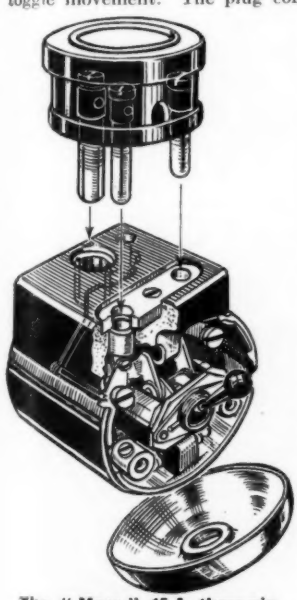
The anti-vibration arrangements embodied in the improved "Warwick" H.O. self-aligning fuse are unusually interesting, and are fitted for marine use only. From strong coppered-steel reinforcing springs at the back of the actual fixed contacts small studs, one on either side, project through the fixed contact blades and engage in recesses in the contact blocks on the bridges. An important point is that the fixed contacts are easily renewable from the front by the removal of four screws at the inside of the base of the clip. The fuses are available in sizes from 5-A to 800-A.



Left: Constructional features of the Warwick self-aligning H.O. fuse, showing how the stud contacts are fixed to the spring and project through the contact blades; right, the 5/15-A fuse

A Robust Switchplug

The new "Meco" switchplug is of the surface type with a side entry plug and incorporates a patent positive action toggle movement. The plug contacts have been designed to comply with B.S.S. No. 372, Clause 14, and small recesses are provided at the plug end of the china base, slightly larger in diameter and immediately under the 5BA screws which connect the plug contacts to the brass connecting links. The housing in the china for the plug contacts is made larger than the outside diameter of the latter, and these two points allow for any lateral movement necessary for the self-adjusting of the tubes.



The "Meco" 15-A three-pin switchplug

A 14 A d.p. type with the cover and the handle of the switch connected to one pole of the supply was tested by the N.P.L. and was operated sixty times with the current and voltage increasing from 15 A, 250 V to 20 A, 275 V. With the voltage maintained at 275 V the switch was caused to make and break the circuit ten times at quarter minute intervals on each of a number of loads commencing at 20 A and increasing by steps of 2 A until the switch failed to function when breaking 30 A for the tenth time. Failure occurred through arcing between one pole of the supply and the metal case. The manufacturers are the MARSHALL ELECTRICAL CO., LTD., Marshall Works, Tottenham Mews, Tottenham Street, London, W.1.

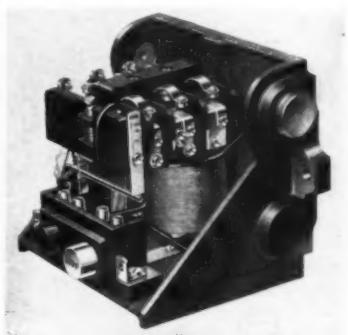
Applying Lead Paint

Equipment has been devised by PNEUMATIC PAINT BRUSH, LTD., 38, King William Street, London, E.C.4, for making possible speedier application of lead paint, the spraying of which is prohibited. A ¼ h.p. motor, suitable for either a.c. or d.c., drives a "Bromak" compressor. The container is constructed of a light-weight alloy, and the control head is secured in position on the tank by four malleable-iron clamps, fitted with steel tightening screws. A pressure gauge is fitted and a safety valve, an air inlet valve with a knurled wheel and taper spindle and an outlet valve. This container is designed for the insertion of the actual tin of paint. The feed pipe, when assembled, reaches the bottom of the can, and the material is continually forced up from the bottom of the paint tin to the control valve in the handpiece. In order that various paints may be used, the working pressure is instantly adjustable to give as low as 5 lb. for liquids and as high as 50 lb. for heavy-gloss paints. To charge the brush with paint the button on the handle is pressed just long enough for sufficient paint to be ejected into the bristles for working.

The "Bromak" electrically operated paint brush

Starters for Small Motors

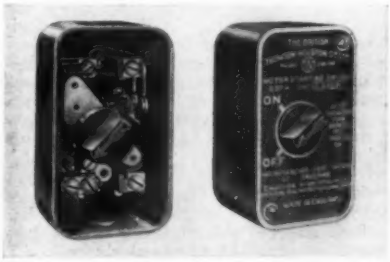
For starting a.c. motors rated at up to 2 h.p. the MIDLAND ELECTRIC MANUFACTURING CO., LTD., M.E.M. Works, Barford Street, Birmingham, 5, has introduced the "Auto-Memota," designed on similar lines to the larger "Memota" starters. It is of very small size, measuring only 6 in. by 4¼ in. by 5 in., but is fully provided with overload protection on the three phases, and no-volt release is inherent.



The "Auto-Memota" starter

The new starter, which is available for voltages from 200 to 440, 50 cycles, at current ratings of from 1 to 4 A, has a double break on each phase. Both fixed and movable parts are heavily plated with pure silver. The small size and neat appearance make it eminently suitable for mounting on independently driven machine tools, and it is claimed by the makers to be the smallest and least expensive starter on the market.

Amongst the recent control gear developments of the BRITISH THOMSON-HOUSTON CO., LTD., Rugby, may be mentioned a small hand-operated switch-starter, type D37-A, which has been designed for controlling and protecting single-phase fractional horse-power motors up to ¼ h.p. at voltages up to 250. The d.p. switch has silver-to-silver contacts which open and close with a snap action. A trip-free feature makes it impossible to hold the switch closed under injurious overload conditions. Overload protection is provided by a thermal over-current relay. Tripping of the relay is effected by the melting of an alloy which normally holds two small parts together. As soon as the metal cools and union is again established the relay is reset by turning the switch knob to the



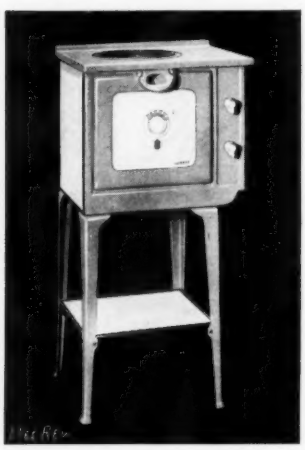
The new B.T.H. switch-starter for fractional h.p. motors

D

"off" position. The switch mechanism, together with its overload device, is mounted on a base of moulded insulation and enclosed in a black-enamelled steel case provided with an engraved aluminium cover. Knock-outs are provided in the top and bottom of the case to accommodate ¾ in. conduit by means of internal and external nuts.

A Small Cooker

Exhibited at the Building Centre, London, is a new cooker made by Messrs. MOFFATS, LTD., Blackburn. The design is on the same lines as that of the larger cookers, there being a balanced drop oven door with a concealed hinge mechanism, and a red line heat indicator. The boiling plate is the new "Pyroy" 10 in. boiler-griller loaded at 1,800 W, and a 990 W element is fitted to the bottom of the oven for roasting and baking. The oven itself, which is brought to a convenient height by four long legs, measures 1 ft wide by 1 ft. deep by 11¼ in. wide. Standard equipment includes a grill pan, oven rack, baking tray and four short legs—long legs and a stand cost 17s. extra. Three finishes are available—"A," porcelain enamel with the exception of the sides; "C," full grey and white porcelain enamel; and "C Special," in ivory, green or crimson trim porcelain enamel. The cheapest model of the series is priced at £6 18s.



The Moffat "E.41-M" cooker

110-V Electric-discharge Lamp

A "Mazda Mercra" lamp suitable for operation on 100-110-V a.c. circuits has now been developed by the BRITISH THOMSON-HOUSTON CO., LTD., Rugby. The original lamp could only be used on pressures of from 200 to 250 V. With this latest development, the street lighting authority on low-voltage supply is able to participate in the advantages of electric-discharge lighting. The appearance and operation of the lamp are the same as those of the standard types, and there are no extra circuit complications of any kind. Both 400-W and 250-W sizes are available.

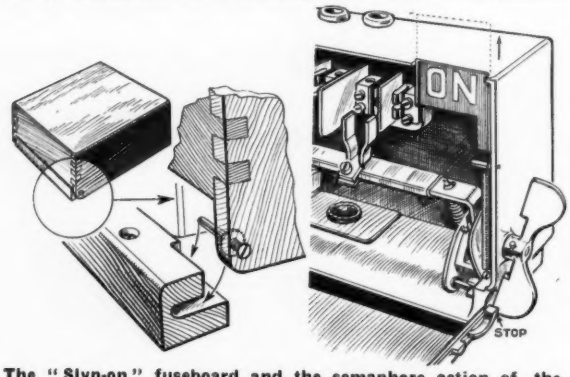
Testing Motor Car Circuits

The "Dynometer"

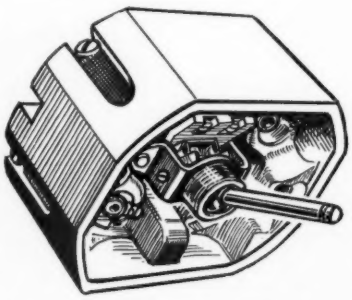
The entire electrical system of a motor car or cycle can be tested in a short time by the new "Dynometer" made by the RUNBAKEN CO., 280, Deansgate, Manchester, 3. No skilled electrical knowledge is necessary, and any garage mechanic can test rapidly the dynamo output (full and half charge), polarity, contact and wear of brushes and commutator, leakages, field coil, starter, earths, and cut-out. Four scales are given—30-0-30 V; 80-0-80 mA; 250-0-250 and 15-0-15 A. The price of the standard instrument is £5 10s., but a moving-coil model with a millivolt scale is also obtainable.

Some New Installation Accessories

MEANS to obviate the inconveniences brought about by the breakages of pilot lamp filaments in cooker control units; shockproof main switchgear for use in conjunction with insulated wiring systems; increased facilities for fuseboard rewiring even in restricted spaces; and extensions to the range of heater switches, are the latest developments of MESSRS. J. H. TUCKER & CO., LTD., King's Road, Tyseley, Birmingham, 11. The cooker control scheme involves a mechanical type of indicator operated direct from the main switch mechanism. This "Semaphore" indicator consists of a bright red "flag" with the word "on" lettered in white enamel which is ejected through the top of the case when the cooker switch is put in the "on" position. The indicator is available in place of pilot lamp arrangements on the company's "Ultraneat" and "Avon" type units at no extra charge. The switch movement of the new "Titan" shockproof switch-fuse is of a robust construction usually found only in ironclad switch-fuses, and is of the rotary type with self-aligning floating-contact blades carried on an insulated coupling bar which engage with stationary main and fuse contacts. A particularly effective and foolproof interlock is obtained by mounting the wing-type operating handle on the hinged front of the case, thus entirely separating it from the switch mechanism when the case is opened. The interlocking feature operates in advance of the switch mechanism.



The "Slyp-on" fuseboard and the semaphore action of the cooker control

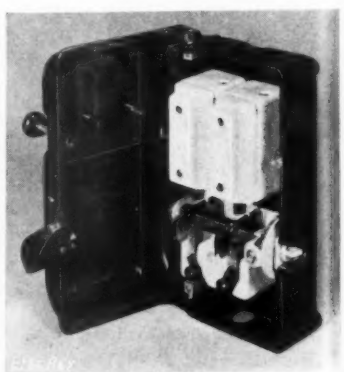


The Tucker d.p. heater switch

Ironclad patterns are also available with bushed holes or tapped for conduit as required, and a corresponding ironclad switch splitter with two-way d.p. fuses. The same internal features and details of design are incorporated in the ironclad patterns as in the brown bakelite shockproof models.

The "Slyp-on" 15-A d.p. range of fuseboards in teak cases covers two- to six-way patterns. The front cover can be entirely removed by placing it in a closed position and sliding it about ½ in. to the right, and, as the name suggests, it will with equal facility "slip on." The cover will also swing forward in the usual way when required for general use.

The fuse units are of the makers' "plug-in" pattern, with circular pin and "Flexi-tube" socket contacts which are particularly easy to rewire. Rewiring is accomplished by slackening the contact pins, placing new wire beneath non-rotating clamping plates, and tightening up the pins. The pins are slotted down their full length for finger grip, and at the ends for use with a coin or screwdriver. No stretching or breaking of fuse wire is possible. This type of fuse unit is also used in the "Ultraneat" and "Avon" cooker control units and in "Titan" switch-fuses.

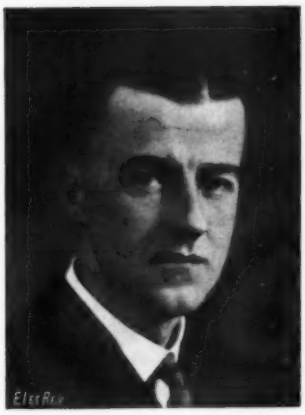


The 15-A shockproof d.p. switch-fuse

The range of heater switches now includes d.p. types in both 15-A and 5-A ratings. The 15-A unit is mounted in a totally enclosed porcelain base, with porcelain insulation between the rocker and contact arms. The movement is quick make and quick break with complete positive action, namely, a direct mechanical drive to the utmost limits of travel, irrespective of the accelerating spring. The spring, being of the compression type, is much stronger than the old tension type, and is not subjected to such strain. Four terminal positions are available for various front, back or side systems of wiring, and facilities are provided for mounting by ring or bolt fixing with automatic earthing. The 5-A d.p. pattern is similar but is mounted on an open-type flush base.

Better Demonstrators. By V. Hindlip Vale

A growing need of the electrical industry



Mr. V. H. Vale is with the General Electric Co., Ltd.

THERE are probably few words in the English language which can be interpreted in so many different ways as demonstrator. In its more academic sense it is understood to mean an assistant to a university lecturer whose duty it is to show and instruct students in the practical work connected with such sciences as physiology, zoology, botany, &c. As the octopus of world commerce has thrown out its tentacles, the word is now generally used to convey the meaning of someone employed to assist in the sale of either a product or appliance by illustrating its possibilities.

To-day demonstrators range from university graduates, who demonstrate the latest design in motor cars, or domestic-science lecturers (who, by the way, must now devote three years to training before they can qualify) who are employed to teach the public that the drinking of milk goes a long way to ensure good health, down to the young girl of very limited education, who endeavours to attract buyers of small inexpensive gadgets by showing their uses to customers in large stores.

For the purpose of this article the electrical industry must be regarded as one of the newest, in so far as it concerns domestic appliances, for there are tens of thousands of women in England to-day who not only have never used an electrically operated appliance, but who have not even a passing acquaintance with such commonplace articles as electric washing machines, electric cookers, &c. For this reason the services of demonstrators are utilised by electricity supply undertakings and appliance manufacturers to carry out the necessary educational work essential to sales.

This demonstrator holds many of the leading qualifications and is seen working in the most modern surroundings—the "Daily Express" cooking theatre, London

As with all new industries, difficulties are encountered only to be overcome, but we inside the electrical industry might well ask ourselves if the best possible effort has been made to educate the public to the practical advantages of electricity in the home. Admittedly much has been done, but if we catechise ourselves as to exactly how much has been accomplished and how effectively it has been carried out, those who are not easily satisfied will confess that, on the whole, we could all afford to be much more enthusiastic, painstaking and critical.

For the demonstration of a slimming device beauty should be chosen before brains

The position was recently brought home to me rather forcefully when in the course of conversation with two big business men, the head of a very well-known advertising agency and the other a director of one of the national dailies. Both agreed that, whilst they had an urge for an "all-electric" home, they were "gas-minded." It is not the purpose of this article to investigate why such a position exists, but only to ask humbly whether every employer of a demonstrator is really satisfied that he or she possesses the necessary qualifications, the education and the right personality for this pioneer work.

Two Types

Broadly speaking, demonstrators of domestic appliances fall into two groups. The first group includes those who might be described as canvassers or super-salesmen, whose time is chiefly occupied by demonstrating very skilfully an individual appliance such as a cleaner or refrigerator. Their effort, plus a persuasive personality, more often than not brings off a sale. It is hardly necessary to say that a very slender knowledge of electricity or other matters is required, and sufficient acquaintance with the chief selling points can generally be obtained in a few days.

I hold the very definite view that the second group, which includes cookery and laundry-work demonstrators, is of far greater importance, for, in addition to a knowledge of the particular appliance in which they are endeavouring to interest the public, they should, if they are to be completely successful, have a sound knowledge of domestic science, of which cookery should hold the first place, as well as unbounded enthusiasm.

To-day it is the exception, not the rule, to find a demonstrator who is capable of imparting information regarding appliances other than those with which she is immediately concerned; nor can she discuss with any degree of certainty general subjects with which housewives of average intelligence are conversant. This being so, her usefulness is naturally limited, and it cannot be expected that such a person will carry the same weight as a woman of experience. This brings me to the question as to what type of person the electrical industry needs to further the educational work which is so essential at the present time.

Essential Attributes

A good general education, preferably to matriculation standard, is of first importance, and is usually forthcoming. Other attributes are given in their order of value: A sound knowledge, not a smattering, of practical domestic science; a suitable personality—including a happy disposition and tact; sympathetic understanding of human nature and ability to see other people's point of view; good health—no one can possibly deal satisfactorily with all the petty annoyances and aggravations which continually occur from contact with a critical public unless she has good health, sound nerves and is not introspective; and good appearance.

Most of my readers are probably surprised that personal appearance comes last in the list, for, judging by the choice of some men, they prefer beauty to brains. Whilst everyone will agree that an attractive appearance gives pleasure to most people, even if unconsciously, so far as demonstrators of domestic appliances are concerned, an intelligent grasp of the subject coupled with a fresh and neat appearance are of far greater value than a pretty face.

It is idle to suggest that all these attributes are likely to be found in every aspirant to success in this career, but it is not too high a standard to set if the good of the industry

is put first. How far demonstrators fall short of this ideal varies considerably. There are, of course, many supply undertakings and manufacturers who appreciate the importance of fully trained workers; others appear to think that ability and aptitude for the work is not of very great moment. There are occasions, such as when extra assistance is required, that an office worker is drafted to the showroom at first possibly temporarily, but in due course finds herself taking on the duties of a demonstrator for which she is inadequately equipped.

A senior member of a supply undertaking or large manufacturer, capable of shouldering responsibility, including the training of a younger assistant, should be a fully qualified domestic science lecturer. Not only will her three years' training have provided her with vision but she will have learned how to teach by practice as well as by lecturing; her training will also have given her a comprehensive knowledge of psychology, the value of which cannot be over-estimated for work of this nature.

This training for lecturing, which is recognised by the Board of Education, can only be obtained in London at the National Training School of Cookery, Buckingham Palace Road; the National Society's Training College, Hampstead, and the Battersea Polytechnic. There are other well-known schools recognised by the Board of Education for the training of lecturers in domestic science at Glasgow, Edinburgh, Gloucester, Newcastle, Leeds, &c.

The Household and Social Science Department of King's College for Women, at which a B.Sc. degree can be obtained, provides a sound knowledge of scientific as well as practical subjects, but it does not undertake to train women to demonstrate.

For less responsible positions and when lecturing experience is not required a one-year course is desirable, and a student of average ability should obtain a sound knowledge of cooking, laundry work and housecraft in twelve months. She has not time, however, to learn the art of teaching and lecturing, and consequently when addressing an audience is very liable to make such obvious mistakes as "Next grill your kidney" or "Now proceed to divide your heart," which may amuse but do not convince.

Age and Salary

Age is not of very great importance provided the person has ability and a sound grasp of kindred subjects as well as the subject in which she has specialised. Her general knowledge must be wide enough to convince critical housewives that her experience outweighs theirs, and a too youthful appearance is, obviously, a drawback. In advertising for a senior demonstrator applications should be invited from women of from thirty to forty years of age who may be presumed to have the necessary experience.

It is impossible to be too definite with regard to salary as it naturally depends upon the employers' requirements. Should they need a person to lecture and to hold the attention of an audience of any number of 10 to 500, she should be a trained lecturer-demonstrator, and remuneration should be in accordance with her experience and training, namely, a minimum salary of £4 10s., rising to £6 or £7 per week. This figure would often prove to be less than that she would be receiving had she chosen a scholastic career, which also carries a pension. The younger woman who has not devoted three years to acquiring a sound knowledge of domestic science and possibly has "picked up" her information or taken a shorter training should naturally receive a lower scale of salary rising from a minimum of £2 10s. to probably £4 10s. per week.

Those in the electrical industry who want to get the best results must be prepared to offer remuneration which will attract first-class brains. It frequently happens that "the powers that be" are too easily satisfied with their demonstration staff merely because they do not appreciate the high standard which can be attained in this particular branch of work and have little or no opportunity of comparing standards.

The Gas Industry's Example

Our competitors, the gas industry, have long since appreciated the point which I have endeavoured to bring home and it may be surprising to many that out of a staff of thirty-one women demonstrators employed by one of the largest London gas companies, no fewer than seventeen are fully trained lecturers, two of whom have degrees; the remainder of the staff have taken short courses at the National Society's Training College, or have received the *cordon bleu* of the National Training School of Cookery. It would be interesting to compare the number of equally well trained women employed in a similar capacity by the electricity supply undertakings covering the same area to see how far these desirable conditions apply.

Electrical Development by "Talkies"

THE E.D.A. film *première* on Nov. 21st attracted a large audience who were all agog to judge of the success of this bold departure from the ordinary route of propaganda. The theatre—the Prince Edward, W.—is a most comfortable one, but owing, no doubt, to fog there was not quite a "full house."

Many familiar figures were seen among the gathering—Sir Andrew Duncan, of course, the principal officers of the British Electrical Development Association, a host of borough electrical engineers and a good sprinkling of manufacturers and contractors.

After the showing of a news reel Sir William Ray, executive chairman of E.D.A., took the stage and briefly introduced the programme. He seized the opportunity to announce that there was no relationship between himself and Miss Rene Ray, the pretty young lady who played the "lead" in one of the films. While we are mentioning Sir William we may as well say that he also addressed us again at the end of the programme, paying especial tribute to Mr. V. W. Dale, business manager of E.D.A., as being very largely responsible for the successful results. Sir William said that they aimed at securing a million new consumers during the next year and suggested that the slogan "A Million New Consumers" might well be employed in the campaign.

The Programme

Jack Payne and his band formed the subject of the next film. There was some clever work in this but it was, perhaps, a trifle long for the sternly professional audience who were impatient for the real business to begin. Then came "The Wizard in the Wall," the narrative of which we have already related. It is a bedtime story told by a father (Ian Fleming) to his children (Philip Frost and Josephine Sanguin) with an amused mother (Betty Lynne) and an ultra-conservative grandmother (Barbara Gott) in the background. Thales, Galvani, Franklin, Humphrey Davy, Watson and Faraday (the last well played by Gabriel Toyne) appear in brief episodes as the tale proceeds to its conclusion, and the grandmother is finally convinced (indeed, she convinces herself unconsciously), that there is something in these "new-fangled" electrical notions.

After "Mickey Mouse" and his canine friend had entertained the audience for a few minutes, "Well I Never!" occupied the screen. This is the story of the rescue of a young housewife (Rene Ray) from drudgery and lethargy by an electrical demonstrator (Ellen Pollock). The husband's part is played by Victor Gammon. The method of handling this story is somewhat unusual. Throughout the play the demonstrator and the husband are silent, while the young housewife is content to murmur at intervals "Well I never!" The talking is done by an invisible commentator who, as she confesses at the end of the film, is the demonstrator herself. This is definitely not a film for "highbrows" but the appeal is intended to reach widely differing audiences. The critically minded—and we have met a number—may think that the characters are a little overdrawn and the situations somewhat exaggerated.

More convincing is "Plenty of Time for Play" (which followed after an excellent coloured "Silly Symphony"), despite the fact that this is a fantasy of the future. Edward Chapman as the slightly-bewildered author-bore is very good and Atholl Fleming and Joyce Barbour as the ultra-modern young couple of the future are quite credible. They are ably supported by Margaret Gunn, Laurie Hardman and Edmund Dalby. The atmosphere created was such that the discovery that it was all being done in a film studio came as a shock. This film concludes with an invitation to members of the audience to ask for a special booklet which has been prepared.

We are asked to state that for the benefit of a few engineers and others in the Greater London area who were unable to be present at the Prince Edward Theatre on Wednesday last week, arrangements have been made for two performances of the films to be given at the Western Electric Co.'s theatre at Bush House, Aldwych, W.C.2, on Thursday, December 6th, at 3 and 8 p.m. A limited number of tickets can be obtained on application to E.D.A., 2, Savoy Hill, London, W.C.2.

New Books

Memoirs of a Scientific Life. By Sir Ambrose Fleming. Pp. 244. London: Marshall, Morgan & Scott, Ltd. Price 5s.

In this book Sir Ambrose Fleming gives a straightforward account of his life. From his earliest years engineering, especially in its electrical aspects, interested him, and the imparting of his knowledge to others has provided the main outlet for his professional activities until his retirement in 1926 from the chair of electrical engineering at London University.

In so long a career (he is 85 years of age this month) Sir Ambrose has naturally met most of the eminent pioneers whose names are now of almost legendary interest and has been in close touch with many of the developments of the greatest scientific and historical significance. Well-known names are constantly mentioned in these pages, but it is a defect in a book of this kind to include no index to facilitate reference to men and events.

To the younger generation Sir Ambrose is probably best known for his radio researches and more especially as the inventor of the thermionic valve (he deprecates the use of the term "diode") which made possible the commercial development of wireless as we know it to-day. This was the first detector for wireless waves making use of the emission of electrons from hot bodies and the prototype of many recent sensitive receivers. In a foreword Sir Oliver Lodge draws a parallel between the experiences and opportunities that have assisted them both and compares the uses they have made of them.

Electrical Communication. By A. Lemuel Albert. Pp. 448; figs. 37. London: Chapman & Hall, Ltd. Price 31s.

The various means of electrical communication as they are related to one another in modern practice are dealt with in this work; it is in effect a summarised discussion of the whole communication industry with the object of providing a basic training upon which to facilitate the building up of a successful career in communication engineering.

A knowledge of mathematics up to and including the calculus is necessary for a full understanding of all the text, but a more elementary knowledge will suffice for most of it. The earlier chapters on sound, speech, hearing, transmitters and receivers are excellent, the concise descriptions of condenser transmitters, moving coil and electro-dynamic transmitters giving a very good idea of the most recent developments in this important branch of communication engineering. The theory of transmission is well explained, and the chapter on inductive interference and plant protection is particularly good.

About half the book is devoted to telegraphy and telephony, and in the space available it has not, of course, been possible to give much more than a general survey of the subject, but it is a very good general survey and covers all matters of outstanding importance. References in the text are made to a bibliography at the end of each chapter so that the reader can pursue matters on which he may require more detailed information; most of these references are to American publications.

The book should prove valuable as a general textbook on the principles of electrical communication, and as a reference book for those engaged in the industry.

This Modern World and the Engineer. Pp. 140, illus. Edinburgh: The Royal Scottish Society of Arts. Price 5s.

This volume is in the main a collection of the Keith Lectures given in 1933. The authors, with the exception of Dr. R. Lessing, who writes on chemical aspects, are Edinburgh professors, and they present an up-to-date survey of the field of engineering. The chapter on electrical engineering is contributed by Professor F. G. Baily, this year's president of the Engineering Section of the British Association.

In a paragraph containing some sound remarks on a.c. motors, he states that "the use of electric motors has now become so general that little extension of this can be expected in the future, except by the more complete provision of current over the country." The proportion of horse-power in industry that was mechanically applied in 1930 was still two-fifths of the whole. Surely only a small part of this is in non-electrified areas!

* * *

Shorter Notices

"Theory of Alternating Current Wave Forms," by Phillip Kemp. Pp. 218; figs. 72. Price 15s. "Automatic Protection of A.C. Circuits," by G. W. Stubbings. Pp. 293; figs. 209. Price 15s. "Torsional Vibration—Elementary Theory and Design Calculations," by W. A. Tuplin. Pp. 316; figs. 88. Price 21s. "Lighting Calculations," by H. H. Higbie. Pp. 503; figs. 115. Price 31s. London: Chapman & Hall, Ltd.

"Kohlebürsten," by Dr. J. Neukirchen. Pp. 135; figs. Price RM.6.80. "Die Ortskurventheorie der Wechselstromtechnik," by Dr. Ing. G. Oberdorfer. Pp. 89; figs. Price RM.7.50. Munich: R. Oldenbourg.

Parliamentary News (BY OUR SPECIAL REPORTER)

ON November 22nd the Prime Minister announced that the second reading of the Electricity (Supply) Bill would be taken yesterday, November 29th. The Bill was formally introduced on November 21st.

Lift Accidents

On November 22nd Sir Arnold Wilson asked the Home Secretary whether his attention had been called to the apparent increase of fatal and other accidents, especially to juveniles, in connection with electric lifts in hotels, offices, shops, restaurants, flats, and other non-factory premises; whether all such accidents were reportable and, if so, to whom; and whether he was satisfied that everything possible was being done to prevent such casualties.

Sir J. Gilmour said that the answer to all three parts of the question was in the negative. He had no powers as regarded dangerous practice or safeguards on lifts at such premises, but if he was furnished with any particulars he would certainly consider them.

Interference with Broadcasting

Mr. Holford Knight asked the Postmaster-General whether he could make a further statement as to steps taken to prevent interference with broadcasting and listening-in caused by electrically-operated trolley-omnibuses and tramcars.

Sir Kingsley Wood said that he had no statutory power to insist on the fitting of remedial devices on trolley-buses and tramcars, but all complaints of electrical interference with broadcast reception were investigated by the Post Office and the results were placed before the tramway or other authority concerned. In general, he was glad to say that he found them willing to undertake the necessary modification of their plant.

Electricity and Coal Consumption

On November 26th Mr. Daggar asked the Minister of Transport if he would state the number of units, to the nearest million, of electricity generated by authorised undertakings, railway and tramway authorities and non-statutory undertakings; the percentage increase on the 1921 figures; the quantity of coal and coke used; and the percentage increase on the 1921 figures for the year 1933.

Capt. A. U. M. Hudson, who replied, said that in 1933, 14,964 million kWh was generated and 10,646,267 tons of coal and coke was used. Those figures represented increases of 206 per cent. and 64 per cent. respectively on the 1921-22 figures. The figures for 1921-22 were affected by the prolonged stoppage in the coal industry in 1921.

Gas and Electrical Competition

AN inquiry at the offices of the Board of Trade in London on November 23rd, into an application by the Leeds Corporation Gas Department for a Special Order under the Gas Regulation Act, 1920, dealt with a point of considerable interest to electricity supply authorities.

During the last two or three years considerable attention has been directed in Parliament to the action of certain local authorities in imposing the condition upon tenants of their properties that they must only use electricity, or at any rate that gas could only be used to a limited extent. As a result clauses have been inserted in several Bills promoted by gas companies prohibiting local authorities owning electricity works from imposing such restrictions. The point discussed at the inquiry dealt with the matter from the opposite point of view. The Leeds Corporation Gas Department applied for a small extension of area, and the Electrical Distribution of Yorkshire, Ltd., asked for the insertion of a clause prohibiting the gas undertaking from restricting tenants of Corporation properties in the extended area in their choice of the form of heat, light and power which they used.

It was pointed out on behalf of the Leeds Corporation that at the present moment it had no houses in the new area, and that no allegation could be made that it had ever imposed such restrictions, and, finally, it was contended that the Board of Trade had no power under the Acts of Parliament regulating the gas industry to impose such a clause upon a gas authority. It was further suggested that if electricity supply companies felt that they had a grievance in this matter they must try to persuade Parliament to insert a clause of general application in the Electricity Bill now before Parliament. A clause of general application protecting gas companies against this sort of action by municipalities owning electricity works was inserted in the Gas Undertakings Act of 1934.

On the other hand, on behalf of the Electrical Distribution of Yorkshire, Ltd., it was argued that the Board of Trade had full power to insert any reasonable clause giving protection to those who might possibly be injured in any way as a consequence of the granting of a Special Order.

Having heard the arguments, the Director of Gas Administration (Mr. J. F. Ronca) intimated that he would report to the Board of Trade in due course.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Marking of Imported Radio Apparatus

The Board of Trade announces that a draft Order-in-Council has been laid before Parliament requiring the following imported radio goods to bear an indication of origin:—Class I: radio receiving sets, radio gramophones, electrical gramophones, and electrical audio frequency amplifiers (whether imported complete or in parts). Class II: loud speakers and loud speaker units. Class III: battery eliminators, chokes, condensers, drives for variable condensers, electrical gramophone pick-ups, volume controls, electrical gramophone motors, gramophone turntable units comprising an electric motor and a turntable, headphones, resistances, valve holders and adaptors, transformers, tuning coils, resistance capacity coupling units, choke capacity coupling units, and chassis or frames carrying or adapted to carry a collection of components.

The order applies to goods sold or exposed for sale wholesale in the United Kingdom, whether or not the person so exposing the goods is a wholesale dealer. Goods in Class I must have the indication of origin durably marked on a prominent part of the chassis, and, also where the instrument is in a case, on the front of the case or on a label attached. Goods in Class II must have the marking on the front of the case or on a label attached, or, if there is no case, on the base, chassis or frame. In Class III the indication of origin must be durably marked on each article, but this is not necessary, or in Class II, where the article forms an integral part of an imported set, which is itself marked. The Order will come into force six months from the date on which it is made or on July 1st, 1935, whichever is the later date. Copies can be obtained from H.M. Stationery Office, price 1d. net.

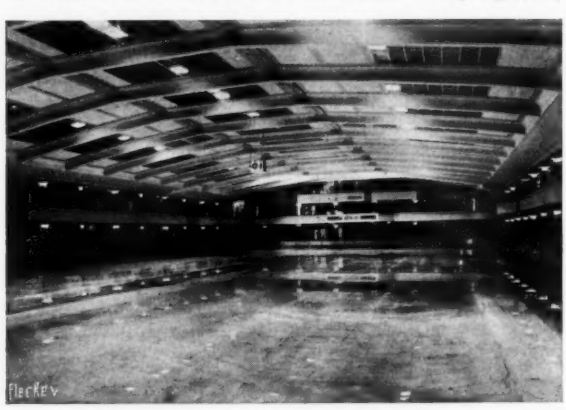
New Factories

It is reported in the daily Press that Messrs. Ferranti, Ltd., are negotiating for the purchase of a factory in Manchester formerly occupied by Messrs. Richard Johnson, Clapham & Morris.

Hanovia, Ltd. (formerly the British Hanovia Quartz Lamp Co., Ltd.) has made arrangements for the erection of a new factory fronting on to the Bath Road at Cippenham, near Slough, Bucks. The building is to be modern in type and will consist of a single storey building with offices and showrooms facing the road and the factory behind. The actual construction will begin in the New Year, but the old Trading Estate factory will not be vacated till about six months later.

Ice Rink Lighting

The new ice rink at Streatham provides an excellent example of good interior lighting. The scheme was the result of co-operation between Messrs. Davis Bros., illuminating engineers,



Streatham Ice Rink illuminated by Philips flood lanterns and lamps

and Philips Lamps, Ltd., and the following equipment made by Philips Lamps, Ltd., has been installed: Fifteen flood lanterns with 500-W gasfilled lamps for public skating; twenty flood lanterns with 1,000-W gasfilled lamps for ice revues and spectacles; forty-one flood lanterns with 1,000-W Philips gasfilled lamps split into colour circuits as required. The total of seventy-six flood lanterns are on dimmer banks with minor, major and master control.

A Hospital Lighting Installation

The lighting of hospital wards has presented the architect and illuminating engineer with a number of special problems These difficulties are mainly due to the fact that one system of lighting has to cater for the needs of a number of patients whose requirements as regards the desirability of light being available at any particular time of night may not agree. A further essential in all hospital fittings is cleanliness, and to this end all projections which might harbour dust must be avoided. These requirements have been met in the installation of ward lighting at the Royal Free Hospital, Gray's Inn Road, shown in the accompanying picture. The fittings consist of a number of dual-purpose opal globe fittings mounted on chromium plated metalwork in the form of pendant fittings for general ward lighting, and brackets for use over each bed The globes are fixed without the aid of gallery screens or

G.E.C. lighting fittings at the Royal Free Hospital

similar projecting portions, and thus lend themselves to easy cleaning, and the general lighting effect is free from glare. The metal tube houses a 15-W "Osram" pygmy lamp, which, when the main lighting is turned off, can be switched on to give a circle of light over the bed without any light whatever escaping outside the immediate area to be lighted. The central pendant fittings are similarly arranged with a metal tube recessed into the bottom of the globe so that a similar local light may illuminate the central gangway and the night nurse's table. The fittings were manufactured by the General Electric Co., Ltd., to the design of Mr. H. Bright, of Messrs. Richards & Bright, the consulting engineers, and the installation work was carried out by Messrs. Gilham & Jones, Newman Street, W.C.1.

The emergency lighting plant installed at this hospital was supplied by the D.P. Battery Co., Ltd., and consists of twenty-six cells, "sealed-in" type, of 75-Ah capacity, and a special D.P. "Keepalite" panel.

A Levant Fair Award

Messrs. Crompton Parkinson, Ltd., inform us that they have received notification of the award of a gold medal for their electric motors exhibited in the British Pavilion at the Levant Fair, held recently at Tel-Aviv, Palestine.

A Paisley Exhibition

An exhibition organised by the Paisley Corporation Electricity Department was opened on November 26th by Provost J. Galt. A comprehensive range of domestic electrical appliances is shown by leading electrical manufacturers. Members of the Electricity Department's staff and local contractors are giving advice regarding the hire of appliances, &c.

Long Service Cables

When engaged upon the conversion of an old Post Office in the provinces into shop premises an electrical contractor found that the original Henley cables used in the circuit were in an excellent condition though installed fifteen years ago, and he was therefore able to leave them to carry on the good work in the new premises.

World Tin Consumption

The November Bulletin of the International Tin Research and Development Council, just issued by the Hague Statistical Office, gives the world's apparent consumption of tin for the twelve months ended September, 1934, as 118,700 tons, as compared with 121,100 tons in the preceding twelve months. The amount of tin used in manufacture is given as 134,500 tons, an increase of 6.9 per cent. over the quantity used in the previous year.

An Electrical Exhibition at Eastbourne

An electrical exhibition was opened at the Pitman Institute, Eastbourne, on Wednesday last by the Mayor of Eastbourne, Coun. Miss Ellen Thornton, and it will continue until December 1st. This exhibition follows a propaganda campaign which has extended over several weeks. Apart from demonstrations of electric cooking, water heating, washing, &c., with which apparatus the public is now familiar, several other demon-

stration units are on view, including the most up-to-date models of electric fires and lighting fittings and labour-saving devices, and the "Mazda" railway display. The Electrical Association for Women has a stand and has arranged for films to be shown illustrating the uses of electricity from a labour-saving and cleanliness point of view, while the Electrical Contractors' Association has equipped a stand with lighting fittings and wireless apparatus. One of the rooms at the exhibition has been transformed into a sun-ray lounge where tea is served. Following the exhibition, the electricity showrooms will concentrate on Christmas displays. One of the most interesting exhibits will be that of the Empress of Britain, of which a 12 ft. model will be on view. Santa Claus will be in attendance to distribute novelties to the children. The whole of the work in connection with the exhibition and showrooms is under the direction of Mr. J. K. Brydges, the borough electrical engineer.

Art Gallery Lighting

The accompanying illustration shows a recent installation of the "Whiteway" lighting system of Messrs. W. R. White & Co. which has been carried out at the galleries of Messrs. Frank Sabin, of Bond Street, W., and is claimed to be the first of its kind in this country. The system embodies the principle of lighting a room by lighting the pictures, and in this instance where whole wall spaces have to be flooded with an even illumination the reflectors are suspended from the ceiling by chains, and can be adjusted horizontally.

The "Whiteway" lighting system in an art gallery

New Electricity Showrooms

The Birmingham Electric Supply Department has equipped new electricity showrooms in Warwick Road, Acocks Green, Birmingham, 4, and these were formally opened by the Lord Mayor (Ald. S. Grey) on November 23rd. These premises are the sixth of the branch showrooms of the Department. In the front is a main showroom for the display of electrical fittings and fires, and behind is a heating and cooking demonstration room; the latter room affords seating accommodation for eighty-five persons. The ground floor is devoted to stores. An electrical ventilating system is installed which is under constant observation by means of a special flush mounting unit with indicating pilot lamps connected in circuit, which glow through amber coloured lenses while the system is working. This pilot unit is a product of Messrs. J. H. Tucker & Co., Ltd., who have also supplied fifty special ceiling fittings with socket outlets to facilitate the changing of lighting schemes, "Sincord" ceiling switches, and combined switch sockets. The Lord Mayor explained that the new showrooms would serve the districts of Acocks Green, Hall Green, Olton, Sparkhill, and South Yardley. These branch showrooms served a useful purpose apart from business and propaganda; 47,000 accounts were paid last year at them. Ald. Sir Percival Bower (chairman of the Electric Supply Committee) stated that during the past five years the number of consumers had increased by 80,000, making a total of 155,000, the largest number connected to the system of any municipal undertaking in the country. Last year's sales of electricity were 496,500,000 kWh.

A sub-committee has been appointed by the Cardiff Corporation Electricity Committee to deal with a scheme for the reconstruction of the fish market in The Hayes, Cardiff, which was recently purchased by the Electricity Department for £25,000. Members of the sub-committee are to inspect electricity showrooms in other towns for the purpose of ascertaining how the scheme can be carried out at a minimum cost. It is estimated that the adaptation of the building will mean an expenditure of nearly £5,000.

The new showrooms for the Electricity and Gas Departments of Coventry Corporation, which have been erected in Corporation Street at a cost of £21,520, were to be opened yesterday (Thursday) by the Mayor, Ald. T. E. Friswell.

Mrs. Hugh Mackenzie, wife of the Provost, performed the opening ceremony in Inverness on November 21st of the Corporation's electricity showroom in High Street. The Provost referred to the growth of the Electricity Department and expressed the hope that the new showrooms would encourage the use of electrical appliances in the home.

Social Events

The annual dinner of the staff of British Insulated Cables, Ltd., was held on November 16th at the Adelphi Hotel, Liverpool. The gathering of 690 included representatives of the company from all parts of the Empire. Amongst those present were Sir Alexander Roger, chairman of the company, Mr. G. H. Nisbett, managing director, and Mr. E. Taylor, director. Col. Tennant, works manager, Prescot, was in the chair. Mr. S. P. Doudney proposed the toast of the company, and Sir Alexander Roger, who responded, said that Mr. Doudney had referred to the services of the men at the top of the organisation; these, however, would be helpless without the loyal co-operation of the rank and file. Mr. Nisbett presented medals to members of the staff who had completed twenty, thirty or forty years' service. Among these were Mr. R. P. Nash, resident electrical engineer, Prescot, and Mr. W. Cowap, Helsby works, who had each completed forty years' service with the company. The number of B.I. long service medals distributed now totals 1,293. An excellent concert was given in the Derby Room, and there was a well-attended whist drive, while dancing took place in the ball room.

The annual dinner of the Southend Corporation Electricity Department was held on November 19th at Garon's Banqueting Hall. Proposing the toast of the electricity undertaking, Ald. R. Tweedy Smith, chairman of the Electricity Committee, said that six months ago it was estimated that the profits of the undertaking would be £2,683, but since then the consumption of electricity had increased at such a rate that they had added £20,000 more income, with the result that the profit would probably be over £12,000 during the coming year. Mr. A. C. Johnson, the borough electrical engineer, said the Department was setting up new records in the increase of electricity consumed and the sale of certain types of electrical apparatus. There were only two undertakings in the country in which the increase in output was equal to Southend's increase of 26 per cent. The maximum number of water heaters sold in any town in 1933 was 1,373 at Wimbledon. He anticipated that this year Southend would dispose of 3,000. The record for boilers was 565; Southend was well on the way to 700, and they would sell quite 1,500 cookers this year. This success was partly due to the propaganda, but was largely attributable to the fact that they had a keen sales staff with Mr. Hooper at the head. Three years ago they were selling electricity at an average of 2.9d. per kWh; the average was now 1.9d. per kWh. The undertaking was successful because the whole of the staff were pulling together.

Trade Announcements

The Electrical and Radio Publicity Service has removed to Albion House, 59, New Oxford Street, W.C.1.

The Colton Electrical Equipment Co. has closed its premises at 12, Moor Lane, E.C.2, and 12, Hamilton Road, N.5. All future communications should be sent to Aetna Works, Elwood Street, Highbury, N.5.

For Sale

Mr. J. Levy will sell by auction on December 13th, at 13, High Holborn, W.C.1, the stock of a wholesale electrical warehouse.

Felixstowe Corporation has for sale an armour-clad 22,000-V switch unit, complete.

Great Yarmouth Electricity Department has for disposal a rotary convertor, frequency-changers, and d.c. motors.

(See our classified advertisements.)

Change of Name

Hestavox, Ltd., 32, Palmerston Road, Acton, W., has changed its name to the Kirby Instrument Co., Ltd.

New Lamp Works in Hungary

A third glow-lamp factory is reported from Budapest to have been established in Hungary.

The Continental Glow Lamp Syndicate

It is reported from Prague that the Continental Glow-Lamp Syndicate has admitted to membership two Czech lamp makers. These are the Nord Böhmische Gluhlampenfabrik Zimmer and Zschecke and the Böhmische Gluhlampen Werke, A.G., both of Aussig.

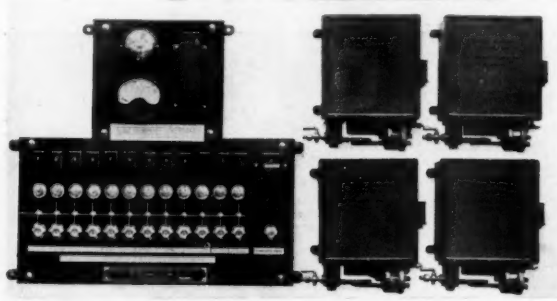
A Large Winding Engine

An order for what is claimed to be the largest winding engine in the world is reported to have been received by the

Siemens-Schuckert Works from the Fushun mines in Manchukuo. The engine will raise 650 tons of coal an hour with a lift of 382 metres and 560 tons with a lift of 782 metres. A second and similar machine is to be obtained in the course of two years.

Salinometers for the " Normandie "

The salinometer equipment for the French 79,000-ton liner *Normandie* has recently been completed by Messrs. W. Crockatt & Sons, Ltd., Glasgow. The units, which are of the multi-point selective type, will give readings from the twelve points under test (*viz.*, main and auxiliary condensers and one drain cooler) at a central instrument board on which are mounted the indicating instrument, interlocked selectors, relays, fuses and a master switch instrument board, warning lamps and bells. The electrical conductivity of the feed water which is a measure of its condition will be under continuous test with a view to the prevention of deposits of salt and other soluble impurities in the boilers. The fitting at each point contains a detector cell and a temperature compensator. Normally each detector cell is in series with a warning lamp which glows brightly if there is an influx of salt; if the impurity exceeds a



The central instrument board of the " Normandie " salinometer equipment and four of the twelve point instruments

definite amount a relay operates a warning bell. The proportion of impurity in milligrammes per litre is ascertained by switching each point in turn to the indicator.

Prices of Materials

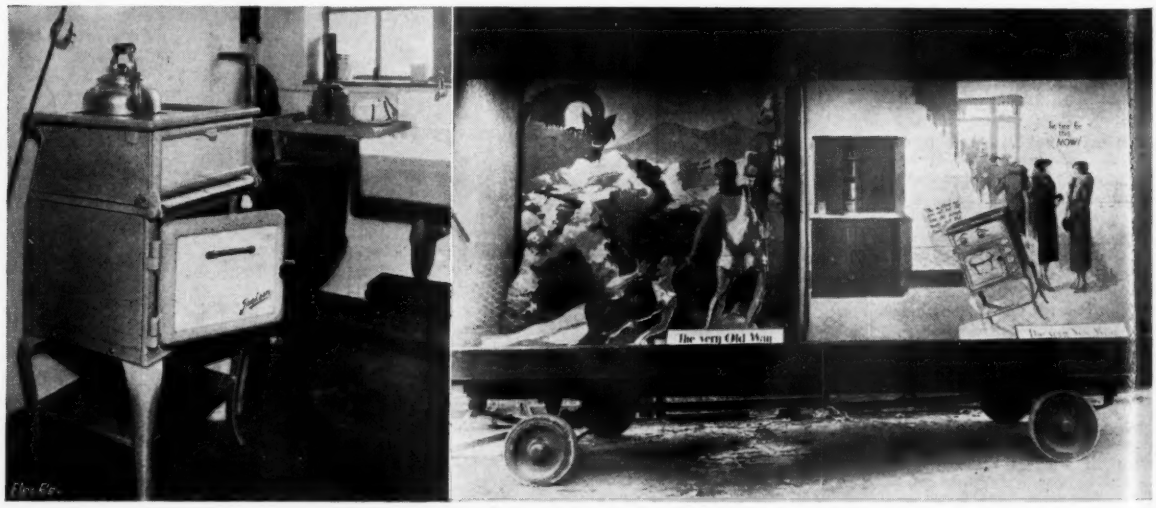
Messrs. F. Smith & Co. report, November 28th: No change in the price of electrolytic copper wire rods and h.c. wire and silicium bronze wire. Electrolytic copper bars, £30 15s., 5s. inc.

Messrs. Edward Till & Co. report, November 28th: No change in the price of India-rubber, Para fine.

Messrs. James & Shakespeare report, November 28th: No change in the price of copper bars (best selected), sheet and rod. English pig lead, £12 15s., 5s. inc. Electrolytic copper sheets, £30 10s. to £31 10s., 17s. 6d. inc.

Electricity in Westminster Flats

The clearing of the slum areas in Westminster is proceeding rapidly, and rehousing on the Pulford Street site is being carried out by the Westminster Housing Trust, Ltd. The tenants are specially encouraged to use electricity in the home. Each flat is wired for electric cooking and lighting. A typical kitchen complete with a Jackson 91J. electric cooker is shown in one of the accompanying illustrations, while a temporary public demonstration kitchen has been arranged in one of the flats for the benefit of tenants by the Westminster Electric Supply Corporation, Ltd. Jackson electric cookers are being demonstrated daily for two weeks. Many of these cookers have already been booked. An attractive flat rate of ¾d. per kWh (in conjunction with a small hire charge for apparatus) is offered by the Westminster Electric Supply Corporation for " all-electric " flats on this estate. Further interest has been aroused in this electrical push by the brilliantly lighted publicity display which has been erected in a show van (which we also illustrate), and placed near the estate.



A Jackson cooker in an electric kitchen at Westminster, and the publicity show van

The Electricity Bill Criticised

In a letter which the Federation of British Industries has addressed to the Minister of Transport regarding the Electricity (Supply) Bill now before Parliament the Federation says that if passed the Bill would establish a precedent leading eventually to a wide semi-State trading without any direct commercial control or economic safeguard. It would mean the overthrow of the principle that the functions of the bodies set up by Parliament for the development of electricity supply (the Commissioners and the Central Board) should be for promoting and co-ordinating the supply of electricity through existing undertakings and not for direct trading purposes. It is suggested that a Bill of such great consequence (as the provision for direct trading to railways and railway works) technically and economically can hardly be dealt with adequately under normal Parliamentary procedure, and therefore should be examined by a Select Committee allowing of the full consideration of the merits and demerits of the case.

One of the resulting dangers of granting even limited trading powers to the Board is that it is most likely to lead to an unfavourable reaction on all other classes of consumers, particularly industrial. It is remarked that ample facilities exist for any railway undertaking to obtain its supplies from authorised undertakers as shown by past and present experience, and as the Bill is apparently not called for by the railway companies, mine-owners, and others who have railway powers, the reason for its introduction is not obvious.

In the House of Commons on Tuesday, according to the *Times*, Mr. Emmott, Unionist Member for Glasgow, presented a petition on behalf of eighty-nine petitioners who are authorised undertakers, some owning and others not owning selected stations. These authorities asked that the Bill should be referred to a Select Committee of the House.

An Exhibition of Insulating Materials

The Ioco Rubber & Waterproofing Co., Ltd., is exhibiting at Vickers House showrooms, Broadway, Westminster, S.W., materials of interest to the electrical and engineering trades. These include " Linapex " varnished cloths, silks and tapes, with well-tested electrical and tensional values, and designed for a variety of insulation uses, " Formapex " synthetic resin varnish paper, boards, tubes, moulding powders, cloth micarta gears for light and heavy usage, and " Ioco " mechanical rubber goods.

The Kensington and Knightsbridge Company

Mr. Justice Eve, in the Companies' Court on Monday, had before him a petition by the Kensington & Knightsbridge Electric Lighting Co., Ltd., to confirm an alteration of the company's articles of association made by a special resolution passed at an extraordinary general meeting of the company held on October 25th last. There being no opposition his Lordship sanctioned the alteration in accordance with the special resolution.

The Met.-Vick. Players

One of Noel Coward's earliest comedies " I'll Leave it to You," was given for three evenings last week by the Metropolitan-Vickers Dramatic Society. This play is written almost entirely in a light vein and an enthusiastic audience on each evening enjoyed the smart repartee which was skilfully handled by the cast. A picture appears on page 767.

New Catalogues and Lists

J. Blakeborough & Sons, Ltd., Brighouse, Yorks.—A booklet on screening plant.

Switchgear & Cowans, Ltd., Old Trafford, Manchester, 16.—A leaflet on S. & C. airbreak gate-end starters.

Synchronome Co., Ltd., 19, Caxton House, Westminster, S.W.1.—A catalogue of synchronous clocks.

Ionic Alkaline Batteries, Ltd., 26, High Street, Stratford, E.15.—Particulars of Ionic nickel-cadmium alkaline batteries.

Ferguson, Pailin, Ltd., Higher Openshaw, Manchester, 11.—Leaflets on automatic free-handle circuit-breakers, hook operated isolating switches, and an oil-immersed isolator.

Cressall Manufacturing Co., Eclipse Works, Tower Street, Birmingham, 19.—A leaflet on sliding and radial type dimmers.

Ruberoid Co., Ltd., Lincoln House, High Holborn, W.C.1.—Particulars of "Pluvex" compound now available in 9d. tubes.

Watson & Sons (Electro-Medical), Ltd., 43/47, Parker Street, Kingsway, W.C.2.—A booklet on "Sunic" therapeutic lamps.

George Angus & Co., Ltd., St. John's Works, Newcastle-upon-Tyne, 1.—A booklet on Rawhide and Durangus silent gears.

Premier Electric Heaters, Ltd., Keeley Street, Birmingham.—A new bowl fire showcard.

F. J. Gordon & Co., Ltd., 114, Euston Road, N.W.1.—A booklet on oxy-acetylene welding.

W. T. Henley's Telegraph Works Co., Ltd., Holborn Viaduct, E.C.1.—A catalogue of outdoor terminal boxes.

Clarmac Engineering Co., Ltd., 48, Payne Street, Port Dundas, Glasgow.—Particulars of electrically heated tar and bitumen boilers.

C.C.A. (Central Cables & Accessories), Ltd., 138, Lever Street, E.C.1.—Price list of rubber insulated cables and wires.

Bankruptcy Proceedings

W. E. Magson, 54, Vyner Street, York, lately 10, Castlegate, Malton, electrical engineer.—At the public examination of this debtor, held at the Court House, Scarborough, on November 20th, it was stated that the unsecured liabilities amounted to £305, and there was an estimated deficiency of £282. Debtor stated that he commenced business on his own account in 1927 as an electrical engineer, with a capital of £225. He purchased the stock, fittings, goodwill, &c., of an existing business for £135. He traded successfully until September, 1932, when an epidemic of typhoid fever broke out in the district, as a result of which his business was seriously affected, and since that time trade had further declined. Creditors had pressed, and in some instances executions had been levied. The examination was concluded.

S. J. Garrod, trading as the Electrical Repair & Manufacturing Co., 181, St. John Street, E.C.1, and as the Gar-Wood Manufacturing Co., 34, Clerkenwell Close, E.C., electrical engineer.—Trustee, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C., released November 5th.

A. J. Harding, electrical engineer, 50-51, Broad Street, and at West Street, Hereford.—Last day for receiving proofs for dividend December 8th. Trustee, Mr. O. B. Wallis, 133, St. Owen Street, Hereford. Official Receiver.

E. C. Wood (Radio Equipment Co.), wireless dealer, 15, Brook Street, Chester.—First and final dividend of 3s. 7½d. in the £, payable December 7th, at St. Peter's Churchyard, The Cross, Chester.

J. H. Read (Read Bros.), electrical engineer, 100, High Street, Erdington, Birmingham.—First meeting, November 30th, at 159, Great Charles Street, Birmingham. Public examination, December 12th, at the Court House, Birmingham.

A. Clough, wireless dealer, 28, Town Street, Horsforth, nr. Leeds.—First and final dividend of 1s. 9d. in the £, payable December 7th, at 24, Bond Street, Leeds.

T. A. J. Edmunds (Essanee Radio & Electrical), wireless dealer, 5, Lena Gardens, Hammersmith, W.—Application for discharge to be heard at Bankruptcy Buildings, Carey Street, W.C., on December 12th.

C. W. Everson (Everson's Electrical & Radio Depôt), radio dealer, 93, High Street, Brownhills, near Walsall.—Last day for receiving proofs for dividend, December 4th. Trustee, Mr. F. E. Bendall, Midland Chambers, Warwick Passage, Corporation Street, Birmingham.

C. Doherty, electrical contractor, 28a, New Cannon Street, Manchester.—First and final dividend of 11½d. in the £, payable November 28th, at the Official Receiver's Office, Byrom Street, Manchester.

B. M. Cowper and **L. J. White** (Mac's Radio), electrical engineers and wireless dealers, 497, Bristol Road, Birmingham.—Trustee, Mr. C. Hoult, 159, Great Charles Street, Birmingham. Official Receiver, released November 3rd.

L. C. Merrison, Radio House, High Street, Bushey, radio and electrical engineer.—The public examination herein was held at St. Albans on November 14th, when debtor was ordered to lodge a statement of affairs within seven days.

M. Glanfield (Broadway Radio), 7, Broadway, London Road, Portsmouth.—First and final dividend of 2s. 3d. in the £, payable November 20th at 87, High Street, Portsmouth.

G. F. Richards, wireless and electrical dealer, 1, Peel Street, Kidderminster.—Last day for receiving proofs for dividend December 1st. Trustee, Mr. A. M. Fairbairn, 1, Priory Street, Dudley, Official Receiver.

R. Robinson, electrical engineer, The Arcade, Waterfoot.—Trustee, Mr. R. K. Clark, Byrom Street, Manchester, Official Receiver, released November 9th.

Company Liquidations

Hurley, Edwards & Thomas, Ltd.—Particulars of claims to the liquidator, Mr. C. W. Griffin, 110, Bute Street, Cardiff, by December 31st.

Eagleston & Son, Ltd.—Meeting, December 19th, at 1 and 2, The Plain, Oxford, to receive an account of the winding-up by the liquidator, Mr. R. W. Thornton.

Pasco (Liverpool), Ltd.—Meeting, December 20th, at 61, Lord Street, Liverpool, to receive an account of the winding-up by the liquidator, Mr. J. H. Hort.

Great West Electrical Co., Ltd.—Winding up voluntarily. Liquidator, Mr. W. R. Sharp, 11, Waterloo Place, Pall Mall, S.W.

Unity Lamp & Accessories, Ltd.—Particulars of claims by December 31st, to Mr. S. H. Swallow, 28, Basinghall Street, E.C.

Forum & Co., Ltd.—Particulars of claims by December 31st to the liquidator, Mr. W. F. Chaundy, 71, Temple Row, Birmingham.

Dissolution of Partnership

District Radio (Stoke-on-Trent), wireless dealers, 97, Wells Street, Tunstall, Stoke-on-Trent.—Messrs. W. H. Brown and F. Bowers have dissolved partnership.

A Winding-up Order

In the Companies' Court on Monday Mr. Justice Eve made an order for the compulsory winding-up of Plew Television, Ltd., on a petition by a creditor for £267.

China's Electrical Import Trade

UNDER the new and more detailed classification adopted in the Chinese foreign trade returns it is now possible to compare the values of the electrical trade in 1933 and 1932. The following table gives the imports last year, with notes of increases or decreases compared with 1932.

It will be seen that the only noteworthy increase is that shown in Great Britain's supplies of radio sets and parts. Germany has lost ground in the electrical trade generally, and it is evident that many competing countries are actively contesting the market. Values are given in the Customs gold unit, which equals about 1s. 8d.

Between 1931 and 1932, also, there was a marked decline in imports of electrical fittings and installation material, attributable to China's determined efforts to become independent of Japanese imports and to develop her own lines of manufacture.

	1933. Gold Units.	Inc. or Dec. Gold Units.
Dynamos and generators—		
Total	433	— 481
From Germany	140	— 470
„ United Kingdom	85	— 77
„ United States	100	+ 54
Elec. motors and parts—		
Total	1,118	— 439
From Belgium	38	— 84
„ Germany	329	— 135
„ United Kingdom	256	+ 30
„ Japan	85	— 75
„ Sweden	152	— 21
„ United States	104	— 18
Transformers—		
Total	415	— 169
From Germany	148	+ 11
„ United Kingdom	139	— 78
„ Japan	40	— 24
„ United States	29	— 35
Elec. machinery, n.o.e.—		
Total	707	— 15
From Germany	174	— 14
„ United Kingdom	316	+ 9
„ Italy	70	+ 54
„ Japan	23	— 70
„ United States	41	— 23
Radio sets and parts—		
Total	1,941	— 200
From Germany	154	— 160
„ United Kingdom	461	+ 380
„ Japan	39	— 64
„ Holland	74	+ 37
„ United States	1,113	— 17

	1933. Gold Units.	Inc. or Dec. Gold Units.
Other telephone and telegraph instruments and material—		
Total	1,164	— 539
From Belgium	129	— 881
„ Germany	515	+ 171
„ United Kingdom	170	+ 101
„ United States	240	+ 151
Electric bulbs—		
Total	372	— 349
From Germany	46	— 101
„ Japan	242	— 144
„ Holland	23	— 74
Electric cables—		
Total	1,120	— 40
From Germany	166	— 37
„ United Kingdom	632	— 37
„ Japan	160	+ 93
Accumulators and dry cells—		
Total	1,583	— 256
From Germany	48	— 11
„ United Kingdom	114	+ 9
„ Hong Kong	20	— 29
„ Japan	29	— 79
„ United States	1,338	— 159
Insulated wire—		
Total	1,052	— 542
From Germany	284	— 282
„ United Kingdom	91	— 11
„ Japan	468	— 163
„ United States	66	— 40

	1933. Gold Units.	Inc. or Dec. Gold Units.
Elec. fittings and materials, n.o.e.—		
Total	1,194	— 224
From Germany	273	— 37
„ United Kingdom	238	— 20
„ Japan	297	— 171
„ United States	243	+ 26
Elec. lamps and lampware—		
Total	247	— 20
From Germany	81	— 1
„ Japan	29	— 37
„ United States	39	+ 2
Elec. fans and accessories—		
Total	126	+ 8
From Germany	3	— 11
„ United Kingdom	27	— 5
„ United States	75	+ 26
Flashlights and torch cases—		
Total	34	— 22
From Hong Kong	10	— 26
„ United States	9	+ 4
„ Japan	6	—
Elec. meters and parts—		
Total	549	— 128
From Germany	203	— 62
„ Switzerland	91	+ 66
„ United Kingdom	109	— 38
„ United States	65	— 79
Elecl. appliances, n.o.e.—		
Total	519	— 88
From Canada	15	— 20
„ Germany	75	— 5
„ United Kingdom	39	— 11
„ Japan	28	— 22
„ United States	344	— 16

Electricity Supply

Lighting, Domestic, Power

Arbroath.—CHANGE-OVER.—Arbroath Electric Light and Power Co. is considering the question of changing over from d.c. to a.c.

Bridlington.—NO SALE.—At a meeting of the General Purposes Committee of the Town Council it was unanimously decided not to sell the electricity undertaking to either of two concerns which had been negotiating in the matter for some time. It is understood that the Council was offered £183,000.

Brierley Hill.—OVERHEAD LINE.—The Urban District Council has consented to the use of overhead lines in the Oak district of Kingswinford by the Midland Electric Corporation for Power Distribution, Ltd.

British Columbia.—A SUCCESSFUL EXPEDIENT.—Engineers of the Electric Railway Co., Ltd., engaged in erecting a new 53-mile transmission line in the interior of British Columbia were faced with the problem of carrying the cable across a swiftly flowing river approximately 300 ft. wide. A 6 ft. kite was constructed under the supervision of one of the men who had extensive knowledge of the subject, and by this means a light line was carried to within 30 ft. of the desired place. This line was used to haul a heavier line across, to which the actual transmission line was attached.—*Electrical West.*

Buriton (Hants).—EXTENSION OF SUPPLY.—The Mid-Southern Utility Co. is to erect overhead lines to the district.

Charlesworth.—OVERHEAD LINES.—As an outcome of a recent inquiry the Minister of Transport has made orders in favour of the Trent Valley & High Peak Electricity Co. erecting overhead lines at Charlesworth and Gamesley. A supply will shortly be available to the latter area.

Croydon.—IMPROVED STREET LIGHTING.—When the London Passenger Transport Board proceeds with the substitution of trolley vehicles for tramcars on the West Croydon to Crystal Palace route, the Electricity Committee proposes to take the opportunity to improve the street lighting, and recommends the following expenditure: Alterations to twenty-five lighting equipments on tramway standards (£350), alterations to lighting equipments on public lighting standards (£589), conversion of fifty-six existing lighting equipments to 250-W "Osira" discharge-lamp combinations (£893), and provision of five additional lighting points with 250-W discharge-lamp combinations (£160), making a total of £1,992.

DEVELOPMENT.—The Electricity Committee is to extend mains and distributors at an estimated cost of £2,191.

LOANS.—Sanction has been obtained to loans amounting to £12,032 for switchgear, transformers and building work.

SUB-STATION.—The Electricity Committee recommends the purchase of a site at Dartnell Road for the erection of a sub-station.

Dagenham.—HIGH-PRESSURE TURBINE.—The large high-pressure turbine which was switched on by the Duke of Kent during a recent visit to the Ford Motor Co.'s factory at Dagenham has now been put into operation, after having undergone a series of preliminary tests. The turbine is supplied with steam at a pressure of 1,200 lb. per sq. in., which is much greater than that used for such purposes in other power houses. It is 87 ft. long and, with condensers, weighs over 250 tons. It runs at 3,000 r.p.m. and has a capacity of 30,000 kW. By a special design part of the steam is extracted while still at a relatively high pressure, and, having been used to generate electricity, it is applied for heating purposes in the factory.—*The Times.*

Dover.—LOAN.—The Town Council has applied for a loan of £2,315 for additional work on the d.c. switchgear.

Germany.—A NEW SUB-STATION.—Some particulars are given in a recent issue of the *Siemens Review* of the new sub-station which has been completed at Bleiloch by Siemens-Schuckertwerke A.-G. for the Thuringenwerke Ges., Weimar. The object of the station is to provide a connection between a hydro-electric power station on the upper reaches of the Saale and the 100-kV power distribution system in Saxony and the 50-kV network in Thuringia. The station also supplies a local 10-kV distribution system and power to the hydro-electric station when this is acting as a pumping plant.

Glasgow.—NEW MAINS.—The Electricity Committee is to re-lay cable in Prospecthill Road at an estimated cost of £10,498.

Gravesend.—REDUCED CHARGE.—The Town Council has reduced the "unit" charge for business premises from 1d. to ¾d.

Grays.—INSTALLATIONS TO COST LESS.—The Urban District Council has reduced the charge for installations under the assisted-wiring scheme, and a draft agreement for a bulk supply with the County of London Electric Supply Co., Ltd., embodying the revised terms, has been approved, subject to a revision at the end of five years.

Home Counties.—CHEAPER ELECTRICITY.—The North Metropolitan Electric Power Supply Co., announces that all standard rates for electricity will be reduced from December 1st next in all districts in its area of 660 square miles in Hertfordshire, Middlesex and Essex. The reductions include: (*a*) Two-part tariff: Fixed charge to be decreased in all districts; "unit" charge to be reduced from 1d. to ¾d. per kWh in winter in Edgware, Edmonton, Enfield, Harrow Weald, Kenton, Kingsbury, Southgate, Stanmore, Tottenham, Wembley, Wealdstone and Wood Green; the summer charge remains unaltered. (*b*) Lighting flat rate in Edmonton, Harrow Weald, Kenton, Kingsbury, Southgate, Tottenham, Wembley, Wealdstone and Wood Green reduced from 4d. to 3¾d.; Edgware, Enfield and Stanmore, from 4¼d. to 3¾d.; Barnet, Chingford, East Barnet Valley and Friern Barnet, from 4¼d. to 4d.; Totteridge, from 5d. to 4d.; Harpenden and St. Albans, from 5d. to 4½d.; Boreham Wood, Cheshunt, Elstree, Hertford, Hoddesdon, Potters Bar, Waltham Abbey and Ware, from 6d. to 5d.; Bishop's Stortford, Hatfield, Royston and Stevenage, from 7d. to 6d. There are also reductions in other domestic and power rates, and approximately 150,000 consumers will benefit.

Houghton-le-Spring.—OVERHEAD LINES.—The Ministry of Transport has consented to the erection of overhead lines at Silksworth by the North-Eastern Electric Supply Co., Ltd., Newcastle. An inquiry was held recently when the objectors were the Houghton and Sunderland Rural District Councils.

Isle of Man.—SUPPLY TO RAILWAY.—The Manx Electric Railway Co. has entered into an agreement with the Isle of Man Electricity Board for a supply of electricity for operating the railway in time to deal with next year's seasonal traffic.

Italy.—CONSUMPTION.—During the first seven months of 1934 the consumption of electricity in Italy exceeded 6,922 million kWh. The General Electric Co. of Milan has recently supplied to the Southern Electric Co. two induction regulators of an automatic type, each of 4,500 kVA at 12,000 V, which are said to be the largest so far constructed in Italy.

Kettering.—RURAL SUPPLIES.—Estimates are to be prepared by the Electricity Department of the cost of supplying electricity to Isham and the remaining parishes in the Council's supply area that are still without the service.

Kirkbride.—PUBLIC LIGHTING.—The Council has made arrangements with the Mid-Cumberland Electricity Co., Ltd., for a street-lighting scheme.

Leicester.—ASSISTED WIRING.—The Electricity Committee has decided to introduce an assisted wiring scheme for power. Cooker installations will cost 3¼d. per week for three years; front room heating installations 1¾d.; living room installation 2¾d.; front bedroom 2¼d.; and back bedroom 2¾d.

NEW SUB-STATION.—The Electricity Committee is to erect a sub-station at Freakes Ground, Groby Road.

Liverpool.—LOAN.—Sanction has been received to a loan of £12,568.

London.—ST. PANCRAS.—The Electricity Committee recommends that application be made for sanction to a loan of £2,056 for a.c. mains extensions.

STOKE NEWINGTON.—The Electricity Committee has received sanction to a loan of £5,000 for the provision of mains and services.

Middleham (Yorkshire).—POWER STATION BURNT OUT.—The power house was destroyed by fire on November 13th. The engine was rendered useless, and buildings connected with the power house were also gutted. The fire occurred in the engine-room, and was not discovered until it had a firm hold. A temporary plant was erected.

Motherwell.—ELECTRICITY EXTENSIONS.—The Town Council has granted permission to the electrical engineer to proceed with the extension of mains, distribution pillars and services at an estimated cost of £825, and the provision and installation of meters at £512, subject to the approval of the Electricity Commissioners. The Council has also given authority to apply to the Commissioners for permission to borrow £9,000 for a hire-purchase scheme and for £5,000 for the extension of mains, &c.

New Zealand.—WELLINGTON STATEMENT.—In the report of the general manager, Mr. M. Cable, for the year ended March 31st, 1934, there is shown a total revenue of £307,588, as compared with 322,057 during the previous year. Working expenses increased from £165,388 to £171,664, leaving a net balance of £13,434, which is £7,297 more than for 1932-1933.

The amount of electricity sold rose from 48,997,381 to 50,113,198 kWh, and the number of consumers from 35,444 to 36,151. The average revenue per kWh for all purposes fell from 1.53d. to 1.44d. per kWh.

Oldham.—LOAN.—The Electricity Committee is to apply for sanction to a loan of £25,000 for domestic appliances. There are altogether on circuit at present 2,437 cookers and 1,468 washboilers.

Preston.—LOAN.—The Electricity Commissioners have sanctioned a loan of £1,680 for an extension of coal-conveyor guards at the Ribble Power Station, Preston.

Rhyl.—STREET LIGHTING.—The Lighting Committee is engaged on a new scheme for street lighting, which, except during the holiday season, is at present mainly by gas. It is understood that electricity is to be introduced prominently into the new scheme of street illumination, which will include swinging lamps and a multitude of fairy lights.

Scarborough.—ILLUMINATIONS ABANDONED.—Owing, it is stated, to the high cost of electricity under the grid scheme the Corporation has decided to abandon the Christmas illu-

minations which have been a big feature during the past three years. They were estimated to cost £1,250; under the grid tariff, however, it is now found that the illuminations would cost at least £3,000.

Shipley.—NEW SUB-STATIONS.—The Electricity Committee is to acquire sites for four sub-stations.

Skipton.—DISCOUNTS.—As from November 1st discounts will be allowed on the fixed charge as well as the " unit " charge of the rateable-value tariff.

South Africa.—STREET LIGHTING.—The main road between Paarl and Capetown, South Africa, is now lighted by means of Revo " Magnalite " silvered-glass mirror fittings, mounted over the centre of the road, each unit housing a 300-W gas-filled lamp. We are told that there is no glare whatever, and that visibility, helped no doubt by the clearer atmosphere, is exceptional, the residents actually being able to read newspapers by the light when sitting on their verandahs.

Stanley.—SUB-STATION.—The Urban District Council is to provide a transformer sub-station costing £900 at Oxhill.

Stoke-on-Trent.—SUPPLY EXTENSIONS.—The Electricity Committee has authorised the provision of a supply to the Bentley Tileries, Bradwell Wood (£700); the change-over of the supply to the a.c. system at the premises of Messrs. Gater, Hall & Co., Burslem (£450); and a supply to the Oldfield Brick & Marl Co., Fenton (£3,800).

Stocksfield-on-Tyne.—STREET LIGHTING.—In conjunction with the North-Eastern Electric Supply Co., Ltd., the Prudhoe Urban District Council and the Bromley Parish Council have inaugurated electric street lighting in Stocksfield and Bromley.

Stoke-on-Trent.—LOAN.—The Electricity Committee is seeking sanction to borrow £5,150 for the erection and equipment of a sub-station, &c., at Keelings Road, Northwood.

Swansea.—TIR JOHN STATION.—The new Tir John power station at Swansea is nearing completion. It is expected that the boilers will be under steam in January next, and that the station will be in operation about two months later.

Switzerland.—NEW TURBINES.—The four Escher-Wyss 22,000-h.p. vertical impellor turbines being constructed for the Etzel (Switzerland) hydro-electric station will work under a head of 1,575 ft. The two water inlets will be in parallel, and one nozzle of each turbine will receive the water from one pipe and the second nozzle from the other, thus enabling all turbines to be run on half-load if one pipe is out of commission. The turbine governors will be operated electrically by means of a synchronous motor generator.

Taunton.—CHARGES.—Mr. A. J. Howard, the borough electrical engineer, has sent us a schedule of the charges in his area. At the moment the supply voltage is 210 V a.c., but this will probably be changed to 230 V during 1935. The lighting charge varies from 2¼d to 4½d. per kWh according to the amount of electricity used; cooking and heating are charged at 1d. per kWh during the winter and ¾d. during the summer. On the two-part tariff consumers are charged 9 per cent. per annum on the gross assessment of their premises and ½d. per kWh as a running charge.

Tottington.—REDUCED CHARGES.—The Lancashire Electric Power Co. has informed the Urban District Council of the reduction in the flat rate for lighting by 1d. per kWh.

Turkey.—HYDRO-ELECTRIC POWER.—The exploitation of water-power resources stands at the head of the programme for the second year of the industrialisation of Turkey. A Berlin professor has been engaged by the electrical department of the Ministry of Economy to examine, in collaboration with Turkish engineers, the water-power resources of the country and work out a project for their utilisation. The first object of attention, learns *Reuter's Trade Service* from Continental papers, will be the river Sakaria in Asia Minor, the famous waterfalls at Adalia in the south of Turkey and the waters at Trebizond in the Black Sea region. While these power resources will chiefly subserve the electrification of industries now being started, a further plan is being elaborated according to which a power station to be built on Lake Isnik (the Nicaea of the Bible) would supply the whole region from Yalova to Brusa with light and power. The execution of these projects will be another of the tasks of the Sumer Bank, which is sponsoring the industrialisation of Turkey.

Wallasey.—SUB-STATION.—The Electricity Committee has obtained sanction to borrow £1,013 for the erection of a sub-station at Saughall, Massie, and £4,668 for e.h.v. mains and sub-station equipment at Dock Road.

Wem.—MAINS EXTENSION.—The West Midlands J.E.A. proposes to extend mains along Aston Road to the milk depôt.

West Coker.—STREET LIGHTING INAUGURATED.—On Thursday last week the new electric street-lighting system was officially inaugurated.

Wigton.—EXTENSION PROPOSALS.—Plans announced by the Mid-Cumberland Electricity Co., Ltd., for the future supply of the rural district, provide for the carrying out of mains extensions as soon as possible from Parton to Aikton, Oughterby, Kirkbampton, Fingland, Kirkbride and Newton Arlosh, thus providing the means to supply Bowness, Port Carlisle and Drumburgh at a later date. Other schemes in hand provide for the extension of supplies from Aspatria to Baggrow, Blennerhurst, Fletchertown and Mealsgate, and from Dockrayrigg to Oulton, Gamblesby and Biglands. The company has received permission from the Rural District Council to erect overhead lines at Oughterby, Kirkbride, New Arlosh, Little Bampton and Kirkbampton, and to the British " New-Wrap " factory.

York.—SUPPLY EXTENSION.—The Electricity Department has extended its supply to the village of Rawcliffe, North Riding.

Traction

Bournemouth.—PROVISIONAL ORDER.—It is announced in the *London Gazette* that the Corporation intends to apply for a Provisional Order authorising it to run trolley vehicles along the tramway route in Poole from County Gates to Towngate Street; also, with the consent of the Minister of Transport, along other streets where it is desired to provide turning points or to link up with existing or proposed trolley-bus routes of the Corporation.

Bradford.—TROLLEY-BUSES.—The new trolley-bus service to Thornton, which has replaced the old tramcar service, was opened on November 20th by the Lord Mayor of Bradford (Mr. Walter Hodgson). So far, twelve new vehicles have been put into service on the route, and nine more are to be delivered at the rate of three a week. The makers are the English Electric Company, Ltd. The vehicles, each with accommodation for sixty passengers, have been specially designed for the hilly nature of the country and the snow and ice which often prevails in winter. Speaking after a luncheon which followed the opening ceremony, Mr. L. H. Short, of the English Electric Co., mentioned that although the new trolley-buses would carry sixty passengers, they had only two axles and their weight was 10½ tons. Trolley vehicles previously built, carrying fifty-six passengers, weighed 13½ tons, and three axles were necessary in order to conform with the Ministry of Transport regulations regarding axle weight. The reduction in weight on the new vehicles, he said, had been obtained by the use of all-metal bodies, the frames being of high-tensile steels and the panels of aluminium.

Cardiff.—TRAMS TO REMAIN.—The Lord Mayor of Cardiff (Ald. J. Donovan, C.B.E.), speaking at the Transport Department staff dinner and dance, said that it would be a long time before Cardiff changed over from trams to buses completely. They had a fleet of modern trams worth £1 million.

Darlington.—TRANSPORT UNDERTAKING'S PROGRESS.—During the year ended March 31st, 1934, the Corporation trolley-buses carried 11,250,000 passengers, an increase of 12 per cent. on the previous year. The revenue was £54,809, an increase of £2,400, and the net surplus amounted to £5,880 as compared with £4,131.

Italy.—RAILWAY ELECTRIFICATION.—The official inauguration of the recently electrified Salermo-Naples railway line took place on October 28th. This section derives power from the Carva sub-station through two groups of 2,300-kW plant, one being in reserve. Three-phase a.c. at 60,000 V is transformed down for Brown Boveri rectifiers, which provide a d.c. output at 3,500 V.

Liverpool.—PROPOSED TRANSPORT IMPROVEMENTS.—The transport problem of the city is the subject of a special report prepared by Mr. W. G. Marks, who recently went to Liverpool from Nottingham as the manager of the tramways and omnibus undertaking. According to the *Liverpool Post*, Mr. Marks has considered the possibility of the abandonment of trams and replacing them by petrol or oil-driven vehicles, or, alternatively, by trolley-omnibuses. Because of capital cost of such a change, he is favourable to the continuance of the present system, in which trams are the principal means of transport, but suggests improvement and modernisation of the services. Mr. Marks states that conversion to petrol or oil-driven vehicles entirely would involve a capital expenditure of approximately £2,000,000, and to trolley vehicles of £1,800,000. He submits for the consideration of the Tramways Committee a detailed scheme for the improvement of the transport services at an estimated cost of £1,141,500. The largest item in this sum is the purchase of new rolling stock (300 new tramcars at

Met.-Vick. Players in a scene from " I'll Leave it to You."
(See page 764)

£2,200 each and 120 new omnibuses, which would cost £219,000). He also proposes to lay four and a half miles of new double-track permanent way. The present transport fleet of the city is 719 tramcars and 147 omnibuses, a large proportion of which have been in service for many years.

L.N.E. Railway.—NEWCASTLE ELECTRIC LINE.—We understand that the electric railway which serves Newcastle-upon-Tyne and Tynemouth is to be modernised. Forty-four twin-motor trailer units and three motor vans are to be constructed. The existing vans are to be re-equipped electrically, and thirty-five existing coaches are to be fitted with new brake equipment.

AIR CONDITIONING ON TRAINS.—In order to ensure that passengers are supplied with clean filtered air, the London & North-Eastern Railway Co. has for some considerable time been experimenting with air-conditioning plants on various vehicles running on the East Coast route. Further developments have followed, and certain of the expresses are now provided with apparatus supplied by Messrs. J. Stone & Co. The apparatus is accommodated in a box on the underframe, and air is drawn into the vehicle through oil filters by means of an electrically driven fan. After leaving the fan the air is heated by steam to give a comfortable temperature inside the vehicle and passed through ducts under the floor, being discharged into the compartments through nozzles under the seats. The operation of the equipment is entirely automatic as the fan motor is switched on by a thermostat as soon as steam is applied to the train. The power supply is derived from the lighting batteries, and the equipment continues to function until the steam supply is cut off. During the winter period the air supply is maintained at a constant temperature by means of a thermostatically operated shutter, and during the summer months, when steam is not normally supplied for the heating of trains, the equipment provides filtered air at atmospheric temperature.

New Zealand.—WELLINGTON TRAMWAY REPORT.—In spite of a decrease in the total revenue from £364,896 to £352,475, the balance for the year ended March 31st, 1934, is a profit of £1,382 as compared with a loss of £12,589 on the previous year. The annual report of Mr. M. Cable, general manager, shows that the working expenses fell from £266,814 to £257,242, and the number of passengers carried by 279,073 to 35,710,560. The tram mileage amounted to 4,084,332, as compared with 4,075,374 during 1932-1933.

Sheffield.—PROVISIONAL ORDER.—The Corporation intends to apply for a Special Order to enable it to construct and work new tramways.

Traffic Signals.—Signals are to be installed at the Barking By-pass-Movers Lane junction; junction of Manor, Ferry and Kingston Roads, Teddington; Town Hall Corner, Bridport; Tucker's Corner, Amesbury; Ruthin Road-Bradley Road junction, Wrexham; Crown Hill, George Street and North End, Croydon (£957); Madeley Road and Hanger Lane, Ealing; Cambridge Park and High Street, Wanstead (£925); Victoria Place, Terminus Road and Seaside Road and the junction of Cavendish Place and Seaside Road, Eastbourne. Signals are also proposed in The Street, Ashstead; Bishopton Lane, Stockton-on-Tees, Whellden Street corner, Amersham, New Street, Chipping Norton; Carmarthen; Llandilo, and Cross Hands.

The complicated system of traffic signals at Trafalgar Square, London, which has been in operation for two years, is to be reorganised so that two of the present signals will be removed and seven new ones installed. Traffic signals are also to be installed at Gower Street and Euston Road, London.

Communications

Germany.—RADIO LICENCES.—On November 1st the total number of radio licences in force was 5,725,394, which is an increase of 151,393 over October 1st.

Great Britain.—TELEPHONY.—Owing to the congestion on the submarine cables from England to Northern Ireland, the Post Office is now completing the installation of apparatus for an experimental short-wave radio service working on a wavelength of about 5 metres between Ballygomartin and Portpatrick on the Scottish coast. It is hoped that the wireless telephone circuit will be in operation in time to cope with the Christmas "peak."

Isle of Man.—BROADCASTING STATION DEMANDED.—The establishment of a broadcasting station outside the control of the British Broadcasting Corporation is one of the proposals of prospective candidates for the House of Keys.

Scotland.—SHETLAND WIRELESS TELEPHONY.—The new wireless telephone service between Lerwick and the Island Skerries will shortly be available for public use. Aerials ha been erected on high ground at both places, and the se installed are now being tested by Post Office experts. It is understood that the sets are giving complete satisfaction. This new apparatus is the first of its kind to be tried in Britain over such a distance. The sets installed consist of five-metre ultra-short-wave directional radio sets. There is every likelihood of the outer islands of Foula and Papa Stour being similarly linked up, but as what is termed optical contact must be obtained the mainland bases will have to be at some high point from which these islands can actually be seen.

Turkey.—TELEPHONE EQUIPMENT WANTED.—The Turkish postal authorities have this week invited tenders for the supply of 50 km. of inter-town telephone cable, 100 km. of ordinary double-conductor telephone cable and 50 km. of single-conductor cable.

Whither Electricity Supply?

A Socialist plan for reorganisation

WE have received from the publishers, Messrs. Victor Gollancz, Ltd., a copy of a monograph entitled "The Socialization of the Electrical Supply Industry," by "G. H." (104 pp., price 3s. 6d.).

Whatever else this little book may be it is certainly a readable, and reasonable, review of the history of the supply industry in this country by somebody who is evidently closely acquainted with the subject. The author is mainly concerned to show that while the generation of electricity has been put upon a rational (and national) basis, the situation in respect of distribution is chaotic and he proceeds to suggest remedies.

Having previously defined the duties of the Electricity Commission and the Central Electricity Board he proposes that the former body should be retained in a purely judicial capacity to hear the appeals of interests affected by reorganisation. As to the Board it is suggested that the existing organisation might well be employed to control ten regional distribution boards covering areas corresponding roughly to the present electricity districts. It is recognised that the "local touch" (though not "parochialism") is essential in distribution and it is accordingly recommended that the regional boards should have a pretty free hand in their areas. For the larger municipalities special regional boards are envisaged.

So far perhaps so good; but how is it to be done? The author is a Socialist and naturally concludes that the individual undertakings (particularly those owned by companies) will have to cease to exist. This leads to a study of the financial structure of the industry and a discussion of the means of transferring the undertakings to the ownership of the reconstituted Central Board. The question of valuation is raised and this inevitably involves a discussion of actual, potential and market values. It is suggested that as a general principle the price paid should be based on the average market value of shares for three years prior to the passing of the necessary legislation, but this would not apply where the share value "obviously greatly exceeds the actual value of the assets."

Payment would be made in form of bonds issued by the Central Board upon the security of the whole supply industry. As regards municipalities the Board would merely undertake the responsibility for all outstanding obligations. We should like to hear the I.M.E.A.'s views on this.

The possible results of the reorganisation and the relationship of the industry to the gas and railway industries are discussed in the last part of the book. In this chapter it is interesting to read that "as regards the industrial power load there can hardly be said to be competition [with gas], since this, for some time past, has been almost wholly supplied by electricity." It is thought possible that electricity prices will be reduced at a more rapid rate than gas prices, leading to intensified competition between the two agents in the domestic sphere. This would necessitate further expenditure by the electrical industry while the capital invested in the gas industry was not being fully used. The author suggests that the Central Gas Board, which probably would have been set up by that time, would discuss the allocation of business or areas with the Central Electricity Board "to avoid overlapping, and to provide the best possible service to the public." The rural areas would be developed electrically as a general rule.

Railway electrification is considered a desirable development and Diesel-electric traction is thought to be unsuitable for main-line operation. The author stresses the fact that the success of the grid does not hang upon the electrification of the main-line railways and says that actually the general adoption of electrification would mean the expenditure of an additional £80,000,000 on the grid.

The book is published under the auspices of the New Fabian Research Bureau, but the author makes it clear in a foreword that he alone is responsible for the views expressed, *i.e.*, they are not the "official" Socialist views. He states, however, that they are substantially similar to those put forward in the Labour Party's Policy Report No. 3.—"Reorganisation of the Electric Supply Industry."

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Ashbourne.—December 21st. U.D.C. E.l.p. overhead lines and underground cable, and l.p. overhead and underground distribution and roadwork. (See this issue.)

Australia.—SYDNEY.—Municipal Council. January 7th. Automatic boiler control equipment for three boilers at the Bunnerong power station. (A.Y. 12737.)*

January 14th. Supervisory control equipment for the remote control of switchgear and transformers in a 33-kV sub-station. (A.Y. 12764.)*

N.S.W. Department of Road Transport. January 28th. Traffic control equipment for nineteen street intersections. (A.Y. 12796.)*

BRISBANE.—January 25th. City Council. One 18,750-kW steam driven turbo-alternator, together with cooling equipment, piping, &c. (A.Y. 12741.)*

MELBOURNE.—Posts and Telegraphs Department. January 29th. Ringing and tone equipment (vibratory type) and delayed alarm control equipment. (A.Y. 12771.)*

Beckenham.—December 17th. U.D.C. Electric cookers for period from January 31st next to March 31st, 1936. (See this issue.)

Belgium.—BRUSSELS.—December 3rd. Hotel Communal, Anderlecht. Single-phase electricity meters. Particulars (3f.) from Régie de l'Electricité, Anderlecht.

Bexley.—Electricity Department. One six-panel 22-kV switchboard and cabling. (See this issue.)

Blackpool.—December 11th. Corporation. 6,600-V three-phase compound-filled metal-clad draw-out switchgear. (See this issue.)

Bristol.—December 12th. Electricity Department. Five l.p. switchboards and five e.h.p. armour-clad compound-filled switch panels. (November 23rd.)

Canada.—KENORA.—January 10th. Two electric motor-driven centrifugal pumping units. (G.Y. 14501.)*

Ealing.—December 14th. Electricity Department. 500-kVA, 11,000-V, 3-phase, 50-cycle transformers. (See this issue.)

East Retford.—December 3rd. Corporation. E.h.p. cubicle board and l.p. board. (November 23rd.)

Glasgow.—December 12th. Education Department. Electrical work at St. George's Road School. Specifications from Education Offices (Property Department), 129, Bath Street (deposit £1 1s.); tenders to town clerk.

Goole.—December 1st. West Riding Public Assistance Committee. Electric heaters at P.A.C. offices. Particulars from West Riding County architect.

Harraton (Co. DURHAM).—Paris Council. Installation of twenty-seven electric discharge lamps in the village. Particulars from E. W. Walton, clerk, North Biddick, Washington.

Hindley.—December 4th. Electricity Department. L.p. cable. Particulars from O. P. Abbot, surveyor, Council Offices; tenders to T. Robey, clerk to the council.

Horsforth.—December 11th. U.D.C. Electrical recording apparatus for Scotland Lane waterworks. Particulars from J. E. Aldersley, waterworks engineer, Council Offices (deposit, £2).

Kingston-on-Thames.—December 7th. Electricity Department. Two 500-kVA transformers. (November 23rd.)

Lancaster.—Electricity Department. Medium pressure cables. (See this issue.)

London.—Commissioners of H.M. Works. December 7th. Heating and hot water services at Stepney employment exchange. Specifications, &c., from Room 65D, Third Floor, H.M. Office of Works, S.W.1 (deposit £1).

Metropolitan Water Board. January 8th. One steam turbine with centrifugal pumps and electric generator for Hammersmith pumping station. Specifications, &c., from chief engineer on production of an official receipt for £2 2s., which must be deposited with the accountant to the Board; tenders to clerk of the Board, Offices of the Board, Room 122, 173, Rosebery Avenue, E.C.1.

Manchester.—December 10th. Electricity Department. Switchgear, piping, water valves, storage-type electric water heaters, immersion heaters and two electrically driven circulating water pumps (See this issue.)

Morocco.—RABAT.—December 27th. Posts and Telegraphs Department. Telephone cable. (A.Y. 12756.)*

Newton-in-Makerfield.—December 17th. Electricity Department. 400-kVA and 200-kVA transformers and 11-kV circuit-breaker. (November 23rd.)

New Zealand.—CHRISTCHURCH.—Electricity Department. January 15th. Metal-clad switchgear. (A.Y. 12723.)*

Drainage Board. April 5th Three electrically-driven sewage pumping sets, with starters, pipes, valves, etc. (G.Y. 14505.)*

Five panels of switchgear for supply to a pumping station. (A.Y. 12795.)*

WELLINGTON.—Posts and Telegraphs Department. January 9th. Telephone dials, impulse wheels, &c. (A.Y. 12752.)*

January 21st. 100 microtelephone set cases and 100 microphone transformers. (A.Y. 12754.)*

January 23rd. Telephone equipment. (A.Y. 12776.)*

January 24th. Telephone headgear receivers. (A.Y. 12753.)*

January 29th. Telephone instrument and switchboard cords. (A.Y. 12750.)*

February 13th. Power relays. (A.Y. 12780.)*

Public Works Department. February 19th. 50-kV outdoor switchgear, including steelwork, for Henderson sub-station. (A.Y. 12758.)*

March 5th. Seven 8,000-kVA transformers. (A.Y. 12757.)*

Northern Ireland.—ANTRIM.—December 8th. Mental Hospital Committee. Motor-generator set, &c. Particulars from F. D. Brown, 93, Ann Street, Belfast (deposit, £2).

Oxford.—December 14th. C.C. Education Committee. Rewiring and renewal of electric lighting installation and fittings at Burford Grammar school. Particulars from T. O. Willson, director of education, County Offices (deposit £1 1s.).

Scunthorpe and Frodingham.—December 3rd. Electricity Department. One 500-kVA and one 200-kVA transformer (November 16th.)

Sheffield.—December 14th. Electricity Department. Steam and water piping. (See this issue.)

South Africa.—JOHANNESBURG.—January 7th. Railways and Harbours Administration. One electrically driven overhead travelling crane. (A.Y. 12760.)*

January 29th. Electricity Supply Commission. Steam-raising plant, steam turbine-driven alternators, and three feed pumps and feed heaters and surge tanks. (G.Y. 14522.)*

PRETORIA.—December 28th. Union Tender and Supplies Board. Copper wire and telephone cable. (A.Y. 12797.)*

Southampton.—December 3rd. Electricity Department. Works in connection with the extension of the boiler house at the generating station. Particulars from borough electrical engineer, Civic Centre (deposit, £5 5s.).

Southend-on-Sea.—December 6th. Electricity Department. Two alternators and switchgear. (November 2nd.)

December 7th. Electricity Department. Adaptation of motors and apparatus on consumers' premises from d.c. to a.c. (November 16th.)

Tasmania.—HOBART.—Hydro-Electric Commission. January 7th. Metering equipment. (A.Y. 12774.)*

Witney.—January 2nd. Electricity Department. 11-kV switchgear, indoor, oil-immersed, three-phase transformers, and l.p. distribution fuseboards. (See this issue.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Croydon.—Electricity Committee. Recommended. Feeder switch (£1,253) and switch apparatus (£151).—Metropolitan-Vickers Electrical Co., Ltd. "Croydon" cooker bodies (£1,950).—Revo Electric Co.

Dumfries.—Town Council. Accepted. Extension of switchboard at Leafield Road (£121).—A. Reyrolle & Co., Ltd.

Eccles.—Library Committee. Accepted. Electrical installation at branch library (£160).—Broughton & Irlam Electrical Engineering Co.

Electricity Committee. Accepted. Kiosk and switchgear (£246).—Ferguson, Pailin, Ltd.

Felling-on-Tyne.—U.D.C. Accepted. Electrical installation in fifty-three houses.—B. L. Oliver (Birtley).

Greenock.—Corporation. Accepted. Electric lighting at 804 houses (£3,036).—James Edwards (Glasgow).

London.—L.C.C. Accepted. Electric lighting at Mount Pleasant Lane school, Hackney (£488).—Buchanan & Curwen, Ltd.

PADDINGTON.—General Purposes Committee. Recommended. Continuance of contract for electrical maintenance works for a further three years.—Cunningham, Ltd.

DEPTFORD.—Baths Committee. Recommended. Electric pump and air compressor at Laurie Grove baths (£280).—Worthington-Simpson, Ltd.

FULHAM.—Electricity Committee. Recommended. Electrical fittings for Town Hall (£102).—General Electric Co., Ltd.

HAMMERSMITH.—Electricity Committee. Recommended. Fifty 2,200-V m.c. switches for sub-stations (£30 each).—J. G. Statter & Co., Ltd.

ST. PANCRAS.—Contract and Stores Committee. Recommended. Traffic control signals at the junction of Judd Street and Compton Street (£455).—Siemens & General Electric Railway Signal Co., Ltd. L.p. switchgear at Tavistock Place sub-station (£291).—English Electric Co., Ltd.

STOKE NEWINGTON.—Highways and Sewers Committee. Recommended. Traffic control signals at the Manor House junction (£1,101).—Siemens & General Electric Railway Signal Co., Ltd.

Middlesex.—Health Committee. Accepted. Electrical installations at Percy House schools, Isleworth (£1,021).—Read & Partners, Ltd. Electrical installations at County Hospital extension (£706).—T. Clarke & Co., Ltd. This was the lowest of six tenders, the highest being £946.

Highways Committee. Recommended. Traffic signals at Stag Lane, Hendon (£457).—Siemens & General Electric Railway Signal Co., Ltd.

Mental Hospital Committee. Recommended. Electrical work at Shenley Colony: Internal work (£307).—G. A. Weston; external work (£868)—W. J. Furze & Co.

St. Helens.—Corporation. Accepted. Portable vacuum cleaning set for cleaning interiors of tramcars, trolley-buses, &c.—Sturtevant Engineering Co. Eleven trolley-buses.—Leyland Motors, Ltd. Sub-contractors for electrical equipment.—General Electric Co., Ltd. Trolley wire and overhead line fittings.—British Insulated Cables, Ltd.

Walton and Weybridge.—U.D.C. Accepted. Two single-phase and one three-phase transformers (£474).—Hackbridge Electric Construction Co., Ltd. Kiosks (£603).—Crompton Parkinson & Co., Ltd. H.p. feeder pillars (£154).—Parmiter, Hope & Sugden, Ltd. H.p. feeder cables and laying (£1,073).—Metropolitan Electric Cable & Construction Co., Ltd.

Forthcoming Events

Electrical Power Engineers' Association (*London Local Group*).—Monday, December 3rd. "Superheaters." Mr. H. E. Geer.

Association of Mining Electrical Engineers.—Tuesday, December 4th. Junior Institution of Engineers, S.W.1. 6.30 p.m. "Modern Methods of Improving Boiler-House Efficiency." Mr. S. J. Clifton. (*Kent Sub-Branch*).—Saturday, December 1st. Technical Institute, Dover. 6.30 p.m. "Practical Cable Jointing with Demonstrations." Mr. W. Rowland. (*West Wales Branch*).—Saturday, December 1st. Y.M.C.A., Swansea. "Protection of Overhead Lines." Mr. J. E. Wilkinson.

Electrical Association for Women.—Tuesday, December 4th. 20, Regent Street, S.W.1. 3 p.m. "Modern Developments in Radio." Mr. A. Hall.

Association of Consulting Engineers.—Wednesday, December 5th. St. Stephen's Club, S.W.1. Dinner.

Edinburgh Electrical Society.—Wednesday, December 5th. Philosophical Institution, Edinburgh. "Electrically Operated Lifts."

Institution of Electrical Engineers.—Thursday, December 6th. Institution, London. 6 p.m. Paper on the electrical heating of large buildings by Messrs. R. Grierson and D. Betts. (*North-Eastern Students' Section*).—Friday, November 30th. Armstrong College, Newcastle-on-Tyne. 7.15 p.m. "Application." Mr. L. E. Mold. (*South Midland Centre*).—Friday, November 30th. Grand Hotel, Birmingham. 7 p.m. Annual dinner. Monday, December 3rd. James Watt Memorial Institute, Birmingham. 7 p.m. "Generation, Distribution and Use of Electricity on Board Ship." Messrs. C. W. Saunders, H. W. Wilson and R. G. Jakeman. (*Mersey and North Wales (Liverpool) Centre*).—Monday, December 3rd. The University, Liverpool. 7 p.m. "Hydro-Electric Development in Great Britain." Messrs. A. E. Valentine and E. M. Bergstrom. (*London Students' Section*).—Tuesday, December 4th. 1.30 p.m. Visit to Broadcasting House, W.1. Saturday, December 8th. 10.0 a.m. Visit to British Oxygen Co., Edmonton. (*North Midland Centre*).—Tuesday, December 4th. Queen's Hotel, Leeds. 7 p.m. "Electric Control of Road Traffic by Vehicle Actuation." Mr. T. P. Preist. (*North-Western Centre*).—Tuesday, December 4th. Engineers' Club, Manchester. 7.15 p.m. Paper by Messrs. C. W. Saunders, H. W. Wilson and R. G. Jakeman. (*Wireless Section*).—Wednesday, December 5th. Institution, London. 6 p.m. "Some Principles Underlying the Design of Spaced-Aerial Direction-Finders." Mr. R. H. Barfield. (*South Midland Students' Section*).—Thursday, December 6th. 2.30 p.m. Visit to the works of Metropolitan Cammell Carriage, Wagon & Finance Co., Ltd., Saltley. (*East Midland Sub-Centre*).—Friday, December 7th. Victoria Hotel, Nottingham. Dinner. (*Meter and Instrument Section*).—Friday, December 7th. Institution, London. 7 p.m. "Some Suggestions towards the Improvement of Equipment and Routine Work in the Meter Departments of Supply Undertakings." Mr. J. L. Ferns. (*Tees-side Sub-Centre*).—Friday, December 7th. Annual dance. (*North Midland Students' Section*).—Saturday, December 8th. 2.20 p.m. Visit to the Hunslet works of J. Fowler Co., Ltd.

Notes

Fuel Research

The annual report of the Fuel Research Board issued by the Department of Scientific and Industrial Research (Stationery Office, 3s. net) covers the period ended March 31st, 1934. The director, Dr. F. S. Sinnatt, gives a survey of the national coal resources, and draws attention to the increasing demand for small coal (of which 77 million tons is now cleaned per annum) for domestic as well as industrial uses and for export. The carbonisation of coal is being studied on a works scale in three types of retort. The introduction of steam in the horizontal retort in the last stages has increased the number of therms of gas produced per ton by ten (11 per cent.).

By treatment with hydrogen under pressure almost the whole of the tars can be converted into motor spirit instead of the three gallons per ton hitherto obtainable. A study is being made of the early stages in the direct conversion of coal into oil by hydrogen under pressure; later stages are parallel to the hydrogenation of tar. Experiments with pulverised fuel relate mainly to flexible combustion in Lancashire or marine-type boilers in which the combustion space is limited; difficulties are experienced when the coal contains less than 20 per cent. volatile matter. Three types of burner have been designed at the Research Station, one of which, the "Grid" burner, is in commercial manufacture. Better thermal and economic results than those obtainable with oil are reported with metallurgical heating furnaces, for which the "Grid" burner is used even for outputs as low as 80 lb. of coal per hour. An order is in hand for a plant in which three tons per hour will be consumed in a single burner. The use of pulverised coal at sea and of fuels consisting of a suspension of coal in oil are also subjects of investigation.

Illumination Glassware and Fittings

The revised British Standard Specification for translucent glassware illumination fittings for interior lighting (No. 324-1934), which has just been issued, shows what great practical improvements have been made in manufacture. Whereas formerly it was considered axiomatic that good diffusion was inevitably accomplished at the expense of light transmission, it is now possible to obtain opal globes with transmissions approaching 90 per cent. In the revised, as well as in the original Specification, the diffusing power of the glassware is looked after by a clause which states that the geometric form of the filament of a clear electric lamp, or of a gas mantle, shall not be visible through the glassware and that the brightness of the glassware shall not exceed 5 candles per sq. in. in any direction in which it is viewed in actual use. The relative dimensions of glassware, lamps, and the galleries have received attention and the heat resistant clauses have been modified as the result of very extensive research work both on fittings used with gas mantles and on those used with electric lamps. The most important alteration is, however, the insistence on a high transmission value for glassware. A table is given of the minimum transmissions for totally enclosed glassware for different angular diameters of the neck diameter. The method of testing this requirement is specified in more detail than in the original Specification. The neck and flange dimensions of the glassware and carriers are given in a separate Specification, No. 364-1934 (revised), together with the diameter of the clearance holes in shades, reflectors, or their appropriate galleries for the B.S. bayonet lampholder. Copies of these revised Specifications can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. each, post free.

Fatality

An inquest was held at Derby last Friday on W. S. H. Hall (34), a foreman at the works of Messrs. Haslam & Newton, Ltd. Wm. Sweeting said Hall was testing small condensers, when he collapsed at his bench. He was testing by holding a wire in each hand. Another witness said that the accident probably occurred as the result of a lead slipping, and the bare wire touching Hall's hand. The man had often carried out similar tests. Wm. F. C. Cooper, Home Office inspector, said that from the deep burns on the thumb and finger of one hand and a mark on the other forearm he concluded that the fatal shock resulted from the man holding a lead in one hand and resting the other hand on the handle of the transformer, an unusual type of testing apparatus. A formal verdict was returned.

The Junior Institution

A commemoration dinner was held in Sheffield on November 24th, to mark the close of the jubilee year of the Junior Institution of Engineers and the twenty-first session of the Sheffield Section. Sir George May, former chairman of the Import Duties Advisory Committee, headed a list of distinguished guests and made an interesting speech on tariffs. The president of the Institution, Mr. W. J. Tennant, responded, and Mr. W. H. Cooper, chairman of the Sheffield Section, said that to celebrate the Section's majority, an annual public lecture by a recognised authority was to be inaugurated to deal with the relationship between engineering and ferrous metallurgy.

North-Eastern Students' Dance

The tenth annual dance of the Students' Section of the North-Eastern Centre of the Institution of Electrical Engineers was held at Newcastle on November 23rd. There were about 250 present.

The British Association

Next year's meeting of the British Association for the Advancement of Science is to be held at Norwich from September 4th to 11th. The president will be Professor W. W. Watts, F.R.S., while the Engineering Section will be presided over by Mr. J. S. Wilson.

I.E.E Dinner at Liverpool

The annual dinner of the Mersey and North Wales (Liverpool) Centre of the Institution of Electrical Engineers was held at the Adelphi Hotel, Liverpool, on Monday, November 26th, 1934, under the chairmanship of Mr. R. G. Devey. The 161 members and guests were received by the chairman, the president (Prof. W. M. Thornton), and the Lord Mayor of Liverpool (Alderman F. T. Richardson). Sir Andrew Duncan proposed the toast, "The City and Trade of Liverpool," to which the Lord Mayor of Liverpool responded. The toast of "The Institution" was proposed by Viscount Leverhulme, and replied to by Prof. W. M. Thornton. Mr. A. C. Livesey welcomed the guests, and Sir John Brooke very happily replied. The health of the chairman was proposed by Mr. B. Welbourn.

The E.A.W.

Following the recent exhibition of "Electricity for the Working Woman," the Electrical Association for Women has arranged a series of lecture-demonstrations of electric cooking for working housewives. The recipes to be used at these lectures will be taken from a cookery book (price 2d.) and have been collected by the E.A.W. housecraft lecturer, Miss Dorothy Vaughan, from all parts of the country as suitable for the woman with the smaller income.

Appointments Vacant

Junior mains assistant for Blackpool Electricity Department.

Lecturer in engineering at the Technical College, Cape Town, South Africa.

Engineers for commission as lieutenants in the Royal Army Ordnance Corps.

Sales canvasser for Colchester Electricity Department.

Junior technician (temporary) for L.C.C.

Mains superintendent for Scunthorpe and Frodingham U.D.C. Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

Bakelite table standard representing a yacht.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. A. Latham, distribution engineer to Wolverhampton Corporation, has been recommended by Blackburn Electricity Committee for the appointment of deputy electrical engineer in succession to Mr. Harral, who has been appointed chief engineer and manager of the Blackburn electricity undertaking.

Mr. A. Hugh Seabrook, M.I.Mech.E., M.I.E.E., has joined the board of Electro-Mersible Motors & Pumps, Ltd.

Mr. W. E. Masters, junior assistant consumers' engineer at the Bradford City electricity works, has received presentations from his colleagues on leaving to become consumers' engineer at the Southport electricity works.

Mr. J. A. W. Gregory, traffic superintendent of telephones in the Liverpool area, has been appointed district manager of the Gloucester area. Mr. Gregory started as a boy in the telephone service in Bradford, and during thirty years he has had experience in Leeds, Preston, Southampton and Brighton.

Mr. J. McLeod, M.B.E., of Forest Hall, Newcastle-on-Tyne, has retired after forty-two years' service in the Post Office Engineering Department. He has spent the major portion of his career with the Post Office in the Glasgow district, and played an important part in the demolition of the old wireless mast at Cullercoats wireless station when the old structure was dismantled and a new one erected without interference in the working of the station.

[*Swains.*

Mr. E. M. Ackery

In our last issue we announced the appointment of **Mr. E. M. Ackery,** of Messrs. Sulzer Bros., as technical assistant, specialising in electric heating, to the head office staff of E.D.A., and we now reproduce his portrait herewith.

Mr. J. Irwin Smith, chief of the Post Office Engineering Department for South Durham and North Yorkshire, has retired after thirty years' service in that position. He entered the Post Office forty-one years ago at Doncaster, and eight years after went to Leeds, and later to Middlesbrough. One of the important schemes with which he was connected was the conversion of the telephone services at Middlesbrough and West Hartlepool to the automatic system. The area covered by his department is nearly 2,600 sq. miles. Mr. Smith is a member of the Institution of Electrical Engineers and has been vice-chairman of the Tees-side Sub-Centre. A dinner in his honour will be given on December 1st at Middlesbrough, when a presentation will be made by Mr. F. C. G. Baldwin, superintendent engineer of the Northern District, on behalf of the officials.

Dr. Ing. Theodor Buchhold, the chief engineer of the Traction Department of Brown, Boveri & Co., of Mannheim, has recently been appointed to the Chair of Electrotechnics at the Technical High School of Darmstadt.

Lord Selsdon, Mr. N. Ashbridge, chief engineer of the B.B.C., **Mr. F. W. Phillips,** assistant secretary of the Post Office, and **Col. A. S. Angwin,** the assistant engineer-in-chief of the Post Office, who recently visited the United States in connection with a report on television which is to be made to the Postmaster-General, returned to this country on Friday last. Lord Selsdon stated that he had prepared a full report for the Postmaster-General.

Mr. R. C. Moore, of Hull, has been recommended by the Liverpool Corporation Passenger Transport Committee for the position of traffic superintendent, and **Mr. J. P. Ross,** of Leith, is recommended for the post of works manager. In each case the salary is £800 per annum.

Mr. C. Worswick has been appointed lighting superintendent by the Oldham Corporation Lighting Committee in succession to the late Mr. I. H. Massey.

Councillor H. L. Kirby Johnson, who is managing director of the Martindale Electric Co., Ltd., has been elected chairman of the Estates and Parks Committee of the Hendon Borough Council and a member of the Finance and General Purposes Committee.

Mr. J. Hamilton, superintendent of generation with the Liverpool Corporation Electricity Department, has been recommended by a sub-committee of the Electricity Committee for the position of deputy city electrical engineer at a salary of £1,300 per annum.

Mr. W. Woodiwiss, A.M.I.E.E., the author of the article on "The A.C. Lift Controller" (see page 747), was educated at the Bradford Technical College, gaining the college diploma and also the City and Guilds of London technological certificate with first-class honours. He received his training with the Bradford Corporation Electricity Department, and in 1926 was appointed to his present position as assistant mains engineer, Dundee. Mr. Woodiwiss has previously contributed articles to the ELECTRICAL REVIEW on Merz-Price protection and cinema rectifiers.

Mr. W. Woodiwiss

Mr. M. E. Denny, C.B.E., chairman of Messrs. William Denny & Brothers, Ltd., Dumbarton, has accepted nomination as president-elect of the Institute of Marine Engineers in succession to **Mr. J. H. Silley.** Mr. Denny's formal election will take place at the annual general meeting in March next.

Mr. A. C. Johnson, borough electrical engineer of Southend, was presented with an illuminated column constructed of transparent material in a chromium-plated frame at the recent annual dinner of the Electricity Department on behalf of the staff responsible for the decorative illuminations along the sea front. The presentation was made by Mr. Linton, the chief assistant of the undertaking.

Mr. A. W. Pannell, export manager of the Marconiphone Co., is leaving the company to open up the export side of the business of the Plessey Co., Ltd. Mr. Pannell joined Marconi's Wireless Telegraph Co., Ltd., in 1913, and was transferred to the Marconiphone Co., Ltd., as assistant export manager, in 1927. A few years later he was put in control of the Export Department. **Mr. A. L. M. Benning** will take over Mr. Pannell's duties as export manager.

Mr. J. M'Kay, assistant electrical engineer at the Dalzell Steel Works, Motherwell, has been presented with a wallet of Treasury notes by members of the staff and employés of the electrical department on leaving for South Africa.

Mr. J. N. Robertson, A.M.I.E.E., a senior sales engineer with the British Electric Transformer Co., Ltd., is leaving the company, with which he has been connected since 1922, to-day (Friday), having accepted a position with the Leicestershire and Warwickshire Electric Power Co. **Mr. A. C. Whish,** A.M.I.E.E., who was formerly with the company, has now rejoined the sales staff and has taken over Mr. Robertson's duties.

Mr. Eric Chisholm, the author of the article on "Water Heating" in this issue (p. 749), is a sales engineer employed in the Wembley undertaking of the North Metropolitan Electric Power Supply Co. He was educated at the Harrow County School and subsequently at the Harrow Technical School and Willesden Polytechnic. Mr. Chisholm received his technical training at the General Electric Co.'s Wembley works. He holds a first class certificate of the City and Guilds of London Institute (Department of Technology) in electrical installation work, and he is a student member of the Institution of Electrical Engineers, and a member of the Junior Institution of Engineers.

Mr. E. Chisholm

Mr. J. C. Turnbull, who has been Birmingham sales engineer for Messrs. Higgs Motors, Ltd., since 1930, has joined the Birmingham office of Messrs. Laurence, Scott & Electromotors, Ltd. Mr. Turnbull, who is the son of the late Mr.

J. Turnbull, a Birmingham consulting engineer for many years, is chairman of the South Midland Students' Centre of the I.E.E.

Ald. Sir Thomas E. Higham, the founder-chairman of the Conference of Electricity Supply Authorities in the North-Western Area, was presented with a silver tray to mark the commencement of the sixteenth year of his chairmanship on Tuesday last at the annual conference of authorised undertakings in the North-Western Area at the Manchester Town Hall. The presentation took place in the presence of representatives of electrical undertakings from all parts of the area.

The presentation to Ald. Sir Thomas Higham
Left to right: Mrs. Woollam, Lady Mayoress of Manchester, Ald. W. Walker, Mr. C. D. Taite, Lady Higham, and Sir T. E. Higham

Mr. C. D. Taite (Lancashire Electric Power Co.), who presided, said he was in a good position to appreciate the work of Sir Thomas during the fifteen years he had been chairman of the Conference, because he also was one of the founder members. Alderman W. Walker was co-opted for the same period of time, and it was therefore appropriate that he should make the presentation, especially as he occupied the position of chairman of the employers' side of the National Council and Board. Ald. Walker spoke of the able and amicable way in which Sir Thomas had carried out his duties as chairman and of his devotion to the work of the Conference. The members representing the undertakings in the District Council (No. 3) North-Western Area of the Electricity Supply Industry greatly appreciated his work and service, and had subscribed to the gift which he asked Sir Thomas to accept.

Sir Thomas Higham said the kindness he had received from his friends on the Whitley Council was more than he deserved. For years and years the pleasure he derived from being associated with the Council had been intense, and he would be sorry if the day came when he would have to leave it. Despite the controversial ideas which some members had entertained, both sides had worked well together. One of the proudest days of his life was that when he received a presentation from his employés. In all the public work he had done he had been admirably supported. Mr. Taite, on behalf of the Conference, then handed a bouquet to Lady Higham, who suitably responded.

Obituary

Mr. E. J. Spells.—The death occurred on November 17th of Mr. Edward John Spells, who was in business as an electrical engineer at Invergordon. He was with the Admiralty for some years, being engaged at the dockyard at Invergordon, and he commenced his own business there in 1920. He had been assisted by his son, who will continue the concern.

Mr. R. J. Carter.—The death occurred on November 25th, following an operation, of Mr. R. J. Carter, head of the Electrical Installation Department of the Kettering U.D.C. electricity undertaking. Mr. Carter, who was forty-nine, had been with the Kettering Council since 1905.

Mr. J. S. Watson.—We regret to record the death, which occurred suddenly on November 24th, at the age of sixty-four, of Mr. Joseph Stanhope Watson, head of the Labour and Stores Department of the North-Eastern Electric Supply Co., Ltd. He was playing badminton, when he collapsed and died almost immediately.

[*J. Bacon & Son*
The late Mr. J. S. Watson

Mr. Watson was apprenticed to Messrs. Clarke, Chapman & Co., Ltd., Gateshead, and after a period at sea as a marine engineer he joined the Newcastle-upon-Tyne Electric Supply Co., Ltd. (now the North-Eastern Co.). He was subsequently appointed assistant electrical engineer to the South Shields Corporation, with whom he remained until 1898, when he rejoined the Newcastle Co. in November of that year. When the electricity supply industry formed Whitley Councils in 1919/20, Mr. Watson was appointed chairman of the North-East Coast Area (No. 1) District Joint Board and the North-East Coast Area (No. 1) District Joint Industrial Council, and held these offices continuously up to the time of his death. He was also a member of the local panel of the Court of Referees in connection with Unemployment Insurance. He took an active interest in the various sports and social organisations of the North-Eastern Co., and devoted some of his leisure time to charitable work. He was at work at Carliol House on the morning of his death. He is survived by his widow and one son.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Litholite Insulators and St. Albans Mouldings, Ltd.—Private company. Registered November 19th. Capital, £10,000 in £1 shares. Objects: To adopt an agreement with Litholite Insulators, Ltd., and St. Albans Moulding Co., Ltd., for the acquisition of the respective businesses of those companies and such of the assets of such companies as set out in the agreement, and to carry on the business of manufacturers, purchasers and suppliers of litholite or any similar material, mechanical, electrical or other engineers, moulders, finishers and workers of all kinds of metals and materials, and of wood, stone, rubber, gutta-percha and other substances, manufacturers of domestic, trade or any machinery, manufacturers of and dealers in ironmongery, &c. The directors are: H. A. Judge, Sherwood, 25, Clifford Road, New Barnet, and three others. Solicitors: Joynson-Hicks & Co., Lennox House, Norfolk Street, W.C.2.

John I. Hall & Co., Ltd.—Private company. Registered November 15th. Capital, £3,000 in 800 founders' and 2,200 ordinary shares of £1 each. Objects: To acquire the business now carried on by Mrs. E. Hall, Miss M. F. Hall and W. L. Turvey, as "John I. Hall & Co.," and to carry on the business of manufacturers of and dealers in electrical, gas and oil lamps, quartz lamps, reflectors, bells, fires, stoves, cookers, &c. The directors are: W. L. Turvey, 38a, Fife Road, Kingston-on-Thames, and two others. Registered office: 19, Marina, St. Leonards-on-Sea, Sussex.

Emerson Electric Co., Ltd.—Private company. Registered November 19th. Capital, £2,500 in £1 shares (2,000 deferred ordinary and 500 ordinary). Objects: To carry on business as manufacturers of and dealers in insulating materials for electrical, wireless and all other purposes, &c. The first directors are: R. S. Arnell (permanent chairman), Sellers Hall, Finchley, N.3, and three others. Registered office: Woodside Works, Woodside Grove, N.12.

G.V.D. Illuminations, Ltd.—Private company. Registered November 23rd. Capital, £20,000 in 10,000 6 per cent. cumulative preference shares of £1 each and 40,000 ordinary shares of 5s. each. Objects: To acquire the business carried on by Geo. V. Downer as "G. V. D. Illuminators" and to carry on the business of illuminating, electrical, gas, telegraphic, radio, mechanical and general engineers, &c. The subscribers are: J. Henderson, 71, Onslow Square, S.W.7; and C. E. May, Claremont, Arundel Road, Harold Wood, Essex. Solicitors: Bristows Cooke & Carpmael, 1, Copthall Buildings, E.C.2.

Holliday, Hall & Stinson, Ltd.—Private company. Registered November 24th. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical, mechanical, constructional and general engineers, manufacturers of and dealers in electricity and all kinds of electrical apparatus, &c. The subscribers are: H. A. Holliday (governing director) and Mrs. K. Holliday, 48, Woodland Rise, Greenford, Middlesex. Solicitors: Bulcraig & Davis, Amberley House, Norfolk Street, W.C.2.

Crompton Parkinson Trustee, Ltd.—Private company. Registered November 23rd. Nominal capital, £100 in £1 shares. Objects: To undertake the custody of the investments, moneys and other property forming part of a superannuation fund to be established for the benefit of male employés of Crompton Parkinson, Ltd., and its associated companies. The subscribers are: G. I. Baldock and C. H. Herbert, both of 45G, Bloomsbury Square, W.C.1. Solicitors: Warren Murton Foster & Swan, 45, Bloomsbury Square, W.C.1.

Pioneer Telephone Manufacturing Co., Ltd.—Private company. Registered November 22nd. Capital, £1,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters, patentees and licensees of, dealers in and agents for all kinds of telephone equipment, electric apparatus, &c. The first directors are: N. Grime, "Linden,' Goulden Road, Withington, Manchester; and N. Preston, Chester Road, Poynton, Cheshire. Registered office: 110, Wilmslow Road, Withington, Manchester.

Will's Patents, Ltd.—Private company. Registered November 2nd. Capital, £100 in £1 shares. Objects: To acquire from C. Will all patents rights held by him, to take an option from him and acquire any further improvements, inventions, devices or other methods affecting wireless receiving and transmitting apparatus, and to acquire rights from other persons to whom any patent rights have already been transferred by the said C. Will, especially the rights regarding patent application No. 21306. The first directors are: E. Cohn and O. Hillelsohn, both of 12, Alba Gardens, N.W.11.

Returns of Electrical Companies

C.E.L., Ltd.—The nominal capital has been increased by the addition of £2,000 beyond the registered capital of £250. The additional capital is divided into 2,000 preference shares of £1 each.

C. E. Greenwood, Ltd.—C. F. Phillips, 17, Eliot Vale, Blackheath, S.E., ceased to act as receiver and/or manager on November 15th, 1934.

Dynameg, Ltd.—K. J. Smith, 48, Castle Street, Liverpool, was appointed receiver on November 12th, 1934, under powers contained in debenture dated January 20th, 1934.

Bonnella Brothers, Ltd.—Capital, £7,000 in 1,000 preference and 6,000 ordinary shares of £1. Return dated June 12th (filed November 6th), 1934. 450 preference and 5,000 ordinary shares taken up. £5,450 paid. Mortgages and charges, nil.

Power & Traction Finance Co., Ltd.—Capital, £250,000 in £1 shares. Return dated October 16th, 1934. 6,002 shares taken up. £6,002 paid. Mortgages and charges, nil.

Glynceiriog Electricity Supply Co., Ltd.—Capital, £1,500 in £1 shares. Return dated October 1st, 1934. 1,000 shares taken up. £1,000 considered as paid. Mortgages and charges, nil.

John Dugdill & Co., Ltd.—Capital, £10,000 in £1 shares. Return dated October 25th, 1934. All shares taken up. £3 paid. £3,997 considered as paid. Mortgages and charges, £3,000.

Keighley Electrical Engineering Co., Ltd.—Particulars filed of £3,000 debentures, authorised by resolutions of November 8th and 10th, 1934, charged on the company's undertaking and property, including uncalled capital (subject to debenture dated January 16th, 1922), the amount of the present issue being £2,500.

Aidas Electric, Ltd.—Mortgage dated November 16th, 1934, to secure £5,500, charged on land and buildings at 182, Park Avenue, Ealing. Holders: British & General Insurance Co., Ltd., 66, Cheapside, E.C.

Dicona, Ltd.—Debenture charged on Brookside Mills, Boyer Street, Derby, and the company's undertaking and other property, present and future, including uncalled capital, dated November 14th, 1934, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd., not exceeding £2,000. (The above ranks in priority to debenture dated November 7th, 1933.)

Supra Electra Motors, Ltd.—Michael Moore, Thames House, Queen Street Place, E.C., was appointed receiver and manager on November 19th, 1934, under powers contained in mortgage debentures dated May 12th, 1933, and December 27th, 1933.

Horley and District Electricity Supply Co., Ltd.—Capital, £50,000 in £1 shares. Return dated March 27th (filed July 30th), 1934. 20,640 shares taken up. £18,640 paid. £2,000 considered as paid. Mortgages and charges, nil.

Vaughan Crane Co., Ltd.—Capital, £150,000 in 50,000 preference and 100,000 ordinary shares of £1 each. Return dated September 10th, 1934. 16,880 preference and 53,578 ordinary shares taken up. £43,669 paid. £26,789 considered as paid. Mortgages and charges, nil.

Moreland Electric Welding Co., Ltd.—Capital, £4,000 in £1 shares. Return dated July 4th, 1934. 2,302 shares taken up. £2,302 paid. Mortgages and charges, nil.

Precision Electric, Ltd.—Capital, £500 in £1 shares. Return dated October 18th, 1934. All shares taken up. £500 paid. Mortgages and charges, nil.

G. L. Adamson, Ltd.—Capital, £7,500 in £1 shares. Return dated March 31st (filed October 6th), 1934. 5,100 shares taken up. £600 paid. £4,500 considered as paid. Mortgages and charges, nil.

Tricity Cookers, Ltd.—Debenture dated October 25th, 1934, to secure £2,451, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: Arthur F. Berry, Wellington House, 125/130, Strand, W.C.2.

Bylock Electric, Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £5,000.

Northern Batteries, Ltd.—The nominal capital has been increased by the addition of £12,000 beyond the registered capital of £18,000. The additional capital is divided into 12,000 7 per cent. cumulative participating preference shares of £1 each.

Northwood Electric Light and Power Co., Ltd.—Satisfaction to the extent of £30,000 on September 22nd, 1934, of 6½ per cent. debentures authorised by resolutions of May 11th and 25th, 1925, and registered June 4th, 1925.

Midland Electric Corporation for Power Distribution, Ltd.—Capital, £1,000,000 in 200,000 preference and 800,000 ordinary shares of £1 each. Return dated April 10th (filed August 7th), 1934. 200,000 preference and 700,000 ordinary shares taken up. £834,605 paid on 134,605 preference and 700,000 ordinary shares. £65,395 considered as paid on 65,395 preference shares. Mortgages and charges, nil.

Rawlings Brothers, Ltd.—Capital, £100,000 in 30,000 preference and 70,000 ordinary shares of £1 each. Return dated July 26th, 1934. 21,903 preference and 61,401 ordinary shares taken up. £83,304 paid. Mortgages and charges, nil.

City Notes

Tube Investments, Ltd., reports a net revenue for the year ended October 31st last of £363,815, as compared with £224,286 for 1932-33, to which is added £84,465 brought in. The ordinary dividend for the year is 10 per cent. (against 8 per cent.), with a relative rate on the liaison ordinary shares, and £106,119 is carried forward. The report states that the turnover for the year in all sections of the business exceeded the directors' anticipations. While trade is unlikely in the near future to show any further material improvement, it is also unlikely to suffer any serious contraction. The directors therefore consider that they are justified in recommending the capitalisation and distribution of £252,757 of reserves in the form of fully-paid ordinary shares, and a resolution will be submitted at the annual meeting to be held on December 5th for the distribution of these shares among the ordinary and liaison ordinary shareholders at the rate of one new share for every ten ordinary shares held, and at a relative rate in respect of the liaison ordinary shares.

Crompton Parkinson, Ltd., report a profit for the year ended September 30th last of £131,809, as compared with £102,187 for the preceding year. It is proposed to pay a final dividend of 6½ per cent. actual on the ordinary and "A" ordinary shares, making 12½ per cent. for the year (unchanged). It is also proposed to transfer £55,234 to general reserve account and to capitalise out of this account the sum of £15,234 to be distributed to holders of ordinary and/or "A" ordinary shares in the form of new "A" ordinary shares of 5s. each fully paid in the ratio of seven new shares for every 100 ordinary and/or "A" ordinary shares held. The general reserve will thus be increased by £40,000. The allocations will absorb £90,702, leaving £57,311 to be carried forward.

The British Electric Transformer Co., Ltd., reports a profit of £40,280 for the year ended September 30th last, as against £18,463 for the previous nine months. It is proposed to pay a final ordinary dividend of 10s. 3d., making 15s. 3d. per share for the year. The allocations will absorb £30,031, leaving £1,297 to be carried forward.

A German Electrical Fusion.—The Berlin correspondent of the *Financial Times* reports that at a recent joint meeting of the Supervisory Boards of the Berliner Kraft-und Licht A.G. (Berlin Power & Light Co.), and of the Berlin City Electricity Works, known as "Bewag," the fusion of these two companies was decided upon. The Berliner Kraft-und Licht, A.G., will hold all the shares of the "Bewag." The name of the joint company will be Berliner Kraft-und Licht (Bewag) A.G. An unchanged dividend of 10 per cent. for 1934 was announced by the B.K.L.

Yarrow & Co., Ltd., report a profit of £37,032 for the year ended June 30th last, as compared with £20,110 in the preceding year, to which is added £21,972 brought in, making £59,004. A dividend of 10 per cent. is paid (against 5 per cent.), and £24,004 is carried forward. The report states that further orders for boilers of both marine and land type have been secured, and this department has been kept exceptionally busy.

Birmingham Corporation.—The list was opened on Tuesday last for an issue of £5,000,000 Birmingham Corporation 2¾ per cent. redeemable stock, 1955-1957, at 96½. In the prospectus published the previous day it was stated that the proceeds will be applied in the replacement of mortgage loans to the amount of approximately £4,000,000, and to the extension of the electricity undertaking and other purposes.

Erinoid, Ltd., is holding an extraordinary meeting on December 12th to consider resolutions authorising an increase of the capital to £330,000 by the creation of 55,000 6 per cent. redeemable preference £1 shares, all the shares to be redeemed at par by January 1st, 1960. At the annual meeting held in October, the chairman stated that the allotment would be at the rate of one preference share for every twenty ordinary shares held.

The British Power & Light Corporation (1929), Ltd., is holding an extraordinary meeting to-day (Friday) at which a resolution will be submitted for issuing 200,000 of the unissued £1 shares as preference shares ranking *pari passu* with the 800,000 preference £1 shares created in May, 1932, of which 600,000 only have at present been issued. The present issue will make a total of 1,000,000 preference shares.

The South Wales Power Co.—At an extraordinary meeting held on November 27th it was agreed to increase the capital by the creation of £322,150 of ordinary stock, which will be issued as the directors consider advantageous.

Siemens Bros. & Co., Ltd., have decided not to pay an interim dividend on the ordinary shares. No interim was paid last year, but the final distribution was 4 per cent.

The American Telephone & Telegraph Co. is paying its usual quarterly dividend of $2.25.

Stocks and Shares

TUESDAY EVENING.

THE Stock Exchange markets for purely gilt-edged securities have come to something of a halt, and the rises which have been taking place, with very little intermission, for the past few weeks have not been further continued. Some of the gilt-edged stocks, in fact, have reacted, though the decline is so small as compared with the previous improvement that it may be called negligible. A fairly large speculative account had been built up in British Government stocks, and although the market remains very hard as a whole, the tendency is less buoyant than it was earlier in the month. The Chancellor of the Exchequer made a guarded speech the other evening in which he hinted that it might be as well for the

taxpayer not to place too much reliance upon expectation of decreased taxation next year. On the other hand, Birmingham has found it possible to issue a very considerable loan at a rate of interest which works out to a little under 3 per cent., the matter being worth mentioning because this is the cheapest example of borrowing so far announced by a British Corporation. The public subscription lists to the loan remained open for their full advertised time.

Public Boards' Stock

Nebulous talk as to a possible scheme for conversion of certain British Government stocks is canvassed with more interest than credence.

Central Electricity stocks are again in the ascendant, the 3½ per cent. issue being now 102. The price of the recently-issued 3½ per cent., offered at 93, is 3½ premium, as against its recent best of about a point higher. London Passenger Transport "C" lost two points, going back to 91. Movements in the stock are being dictated at the moment by whatever happens to be the impression uppermost at the time in regard to the case which is being argued between the Board and Thomas Tillings.

London Electricity Supply Shares

The sharp rises which occurred last week upon news relating to the formation of the Central London Electricity Distribution Committee, 1934, have all been held. Westminster Electric Supply are 6d. better at 36s. 6d. North Metropolitan Electric preference strengthened to 32s. 6d. The company has announced a comprehensive scheme of reduction of charges. London Electrics advanced to 37s., and Edmundson's preference to the same price. The ordinary shares in most of the other London companies stand at about the average price of 36s. 6d., showing a return of 3⅞ per cent. on the money, allowing for accrued dividend. Small blocks, ranging from 1,000 to 2,500 shares, are on offer of the ordinary shares in the Brompton, Charing Cross and Chelsea companies, the price asked being 37s. 6d.; South Londons are available at 37s. The return to an investor at these prices averages 3⅞ per cent. A line of a few thousand Notting Hill Electric ordinary shares came on offer at 51s. 6d., at which the yield, on the basis of the last paid dividend of 11 per cent., works out to 4¼ per cent. The shares are not so well known as those of most of the other ordinary shares in the London companies, and this is the reason why the price stands relatively lower than that of other companies in the London area.

Cables and Wireless

The better tendency imparted to the market in Cables and Wireless stocks by the publication of the favourable October index number was neutralised, to some extent, by a certain amount of profit-taking. This served to give the market an easier appearance. The "A" ordinary stock receded to 17¼, the 5½ per cent. preference stock remaining at 80. Globe Telegraph & Trust ordinary went back to 10¼, but the insistent demand for good-class preferences lifted Globe preference 10s. to 13¼. Anglo-American Telegraph deferred stock has advanced to 31½, which brings it, by comparison, higher than the company's 6 per cent. preferred ordinary. The sharp shake-out in American Telephone & Telegraph stock brought in bargain hunters, whose purchases rallied the price to 110½, making a gain of 8 points on the week. Internationals recovered the fraction at 9½.

Manufacturing and Equipment

W.T. Henley's Telegraph Works ordinary shares have hardened to 6⅛, and this in spite of the fact that several thousand have recently been on offer at about 6¾. Shares were taken readily, and the buyers displayed an Oliver Twist attitude with regard to them. At the present price, the return on the money is about the same as that available from Callender's, but higher than that offered by British Insulated, Enfield Cables and General Electrics. Aron ordinary, at 72s. 6d., have parted from a little of their last week's sharp rise. Reyrolle strengthened to 59s. 6d. Crompton Parkinson, at 33s., are 2s. lower. The company's report makes an excellent showing, and it is announced that a bonus of seven "A" shares is being distributed in respect of every 100 old shares, the dividend being retained at the previous 12½ per cent. At the present rate of dividend, the yield on the money is, of course, very meagre, but allowance must be made for the new issue of shares. Ericsson Telephones have risen to five guineas bid.

Miscellaneous Matters

A variety of schemes are said to be germinating for the expansion of tube railways in suburban directions. Several fresh localities in and around London are declared to be the object of the tube-makers' attention. What importance can be attached to these rumours it is impossible to say. No doubt, in years to come, the London tubes will be carried beyond their present termini, but for a time at all events, the London Passenger Transport Board is hardly likely to undertake extensions, unless to provide work for some of the unemployed. British Electric Traction stock is again back to 900, after being 60 points higher. American, Canadian and Mexican utility stocks are better. There has been a good deal of inquiry for Brazilian Tractions. The rubber share market also is better, upon a hardening in the price of the produce.

Share List of Electrical Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Nov. 27.	Rise or Fall.	Yield. p.c. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	78/9	—	3 16 2
Brompton Ordinary	1	7	7	36/–	—	3 17 9
Charing Cross Ordinary	1	7	7	36/–	—	3 17 9
Chelsea	1	7	7	36/–	—	3 17 9
City of London	1	7½	7½	38/6	—	3 18 0
Clyde Valley	1	7	7	42/6	–6d.	3 5 10
County of London	1	10½	10½	59/–	—	3 11 2
Edmundson's 7% Pref.	1	7	7	37/6	+1/–	3 14 9
Elec. Dis. Yorkshire	1	9	9	50/6	—	3 11 4
Elec. Supply Corporation	1	11	11	3	—	3 13 4
Kensington Ordinary	1	7	7	36/–	—	3 17 9
Lancs Light and Power	1	7	7½	39/–	–6d.	3 17 0
London Electric	1	7	7	37/6	+1/6	3 15 8
Metropolitan	1	10	10	55/–	—	3 12 9
Midland Counties	1	7	7	2	—	3 10 0
Mid. Elec. Power	1	8	8	48/9	—	3 5 7
North Eastern Electric Ordinary	1	6	6	35/–	—	3 8 7
Do. 7% Pref.	1	7	7	35/–	—	4 0 0
Northampton	1	10	10	57/–	—	3 10 2
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary	1	10	10	66/–	—	3 0 6
Do. do. 6% Pref.	1	6	6	32/6	+6d.	3 13 10
St. James' and Pall Mall	1	7	7½	38/6	—	3 18 0
Scottish Power	1	8	8	43/–	—	3 14 5
South London	1	7	7	36/–	—	3 17 9
Westminster Ordinary	1	7	7	36/6	+6d.	3 16 9
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	21/6	+6d.	6 19 6
Yorkshire Elec.	1	8	8	48/6	—	3 6 0
Public Boards.						
Central Electricity, 1950–70	Stock	5	5	116	+1	4 6 0
Do. 1955–75	,,	5	5	118	—	4 4 9
Do. 1951–73	,,	4½	4½	111	—	4 1 1
Do. 1963–93	,,	—	3½	102	+1	3 8 8
London & Home Counties, 1955–75	,,	4½	4½	112	—	4 0 4
London Passenger Transport, A	,,	—	4½	124½	–1	3 12 4
Do. do. B	,,	—	5	130	–½	3 17 0
Do. do. C	,,	—	3	91	–2	3 6 0
West Midlands Joint Elec. 1948–68	,,	—	5	118	—	4 4 9
Telegraph and Telephone.						
American Tel. & Tel.	$100	9	9	110½	+8	8 2 10
Anglo-Am. Tel. Pref.	Stock	6	6	120	+1	5 0 0
Do. Def.	,,	1½	1½	30½	+1½	4 18 4
Cables & Wireless 5½% Pref.	,,	2¾	2¾	80	—	3 8 9
Do. A. 7½% Ord.	,,	Nil	Nil	17½	–½	—
Do. B. Ord.	,,	Nil	Nil	7	–½	—
Globe Tel. and T. Ord.	10	Nil	2½	10½	–½	2 8 7
Do. do. Pref.	10	6	6	13½	+½	4 10 7
Great Northern Tel.	10	20	20	38	–1	5 5 3
Marconi-Marine	1	10	7½	32/6	+⅛	4 12 4
Oriental Telephone Ord.	1	12	12	3½	—	*3 13 10
Home and Foreign Trams, Etc.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	5	—	—
British Electric Traction Df. Ord.	,,	5	5	900	–45	—
Do. do. Pref. Ord.	,,	8	8	167½xd	—	4 15 7
Brazil Traction	100	—	—	10¾	—	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	106	—	4 14 3
Mexico Trams, 5% Bonds	—	5	5	21½	+1½	—
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	—	5	5	40	—	—
Victoria Falls Ord.	1	15	20	6⅝	+½	3 0 7
Yorkshire (West Riding)	1	2½	5	25/6	+6d.	3 18 5
Manufacturing Companies.						
Aron Electricity Ord.	1	10	10	72/6	–9d.	2 15 2
Assoc. Elec. Ord.	1	4	3	24/6	—	2 9 0
Do. Prf.	1	8	8	33/9	—	4 14 10
Babcock & Wilcox	1	9	6	46/6	–6d.	2 11 6
British Aluminium Ord.	1	5	5	29/6	—	3 7 9
British Insulated Ord.	1	15	15	77/6	–½	3 17 6
Brush Ord.	Stock	Nil	Nil	37½	—	—
Callender's	1	15	15	3⅝	—	4 9 0
Do. 6½% Pref.	1	6½	6½	32/6	+⅛	4 0 0
Crompton Parkinson Ord.	5/–	22½	12½	33/–	–2/–	1 17 10
Do. 8% Pref.	1	8	8	35/–	—	4 11 5
Edison-Swan 1st Pref.	1	7½	7½	23/9	—	6 6 4
Electric Construction	1	Nil	Nil	17/6	+3/9	—
Enfield Cable Ord.	1	25	20	4½	—	4 2 0
English Electric	1	Nil	Nil	6/3	+6d.	—
Do. do. Pref.	1	Nil	Nil	10/–	+⅛	—
Ever Ready	5/–	35	35	27/3	—	6 8 5
Ferranti Pref.	1	7	7	29/–	—	4 16 7
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	8	8	49/6	—	3 4 6
Henley's	1	30	30	6⅝	+⅛	4 8 0
Do. 4½% Pref.	5	4½	4½	5⅞	—	3 18 3
India-Rubber Preferred	1	—	—	1	—	—
Johnson & Phillips	1	5	5	30/–	—	3 6 8
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1½	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

20510. "Apparatus for the operation of direct-current electric arcs." J. Y. Johnson (I. G. Farbenindustrie Akt.-Ges.). July 20th, 1932. (418971.)

1933

5600. "Protective arrangements for electrical power-transmission systems." R. O. Kapp, C. G. Carrothers, and General Electric Co., Ltd. February 23rd, 1933. (418666.)

5947. "Induction furnace arrangements." General Electric Co., Ltd., C. H. Nunn, and V. Stobie. February 27th, 1933. (418817.)

6531. "Electric selective remote-control systems." Allmanna Svenska Elektriska Aktiebolaget. March 5th, 1932. (418975.)

8604. "Elastic electric conductor." K. Herkenberg. March 22nd, 1933. (418668.)

10083. "Electric tachometers." Bendix Aviation Corporation. April 5th, 1932. (418979.)

10094. "Electric discharge tubes." General Electric Co., Ltd., and J. W. Ryde. April 4th, 1933. (418980.)

12173. "Means for securing incandescent electric lamps in the holders thereof." D. E. Rodwell. April 26th, 1933. (418897.)

12225. "Electrical musical instruments." O. Vierling. April 27th, 1932. (418898.)

12286. "Electromagnetic pickups." W. M. Braun. April 27th, 1933. (418678.)

12546. "Arc lamps for the production of ultra-violet radiation." M. Volmer. April 29th, 1933. (418988.)

12600. "Electric starting apparatus of motor vehicle engines." T. B. S. Hooper. May 1st, 1933. (418825.)

12622. "Incandescent electric lamp filaments and methods of manufacturing the same." B. Erber. May 7th, 1932. (418989.)

12648. "Gas-filled triodes, tetrodes, pentodes, and the like." General Electric Co., Ltd., and D. C. Espley. May 1st, 1933. (Cognate application 35245/33.) (418828.)

12714. "Electric signalling systems for indicating the available seating accommodation in theatres and like places." C. H. Whincup. May 2nd, 1933. (418831.)

12779. "Telephone or like systems." Automatic Electric Co., Ltd., and J. W. McClew. May 2nd, 1933. (418903.)

12826. "Electron-discharge devices or valves." Telefunken Ges. für Drahtlose Telegraphie. May 2nd, 1932. (418990.)

12827. "Gas-filled electric discharge valves and circuit arrangements incorporating the same." Telefunken Ges. für Drahtlose Telegraphie. May 2nd, 1932. (418991.)

12920. "Telephone systems." Automatic Electric Co., Ltd., and F. E. Comyn. May 3rd, 1933. (418995.)

13064. "Electrochemical recording." E. Glas. May 4th, 1932. (418683.)

13143. "Electric couplings." C. H. Thompson. May 5th, 1933. (418999.)

14544. "Electric massage apparatus." J. Scheidegger. May 19th, 1933. (418686.)

15742. "Control systems for electric motors." British Thomson-Houston Co., Ltd. June 15th, 1932. (418917.)

15805. "Electric fuses." R. S. Woods. June 1st, 1933. (418918.)

16097. "Television and like apparatus." J. L. Baird and Baird Television, Ltd. June 2nd, 1933. (418759.)

16444. "Distant-control of electric water heaters and other appliances." Ferranti, Ltd., and W. V. Butterfield. June 8th, 1933. (418838.)

17102. "Electric-arc discharge devices." Westinghouse Electric & Manufacturing Co. July 30th, 1932. (418920.)

17234. "Regenerative braking systems for electric motors." English Electric Co., Ltd., P. L. Mardis, and J. Martin. June 16th, 1933. (418765.)

17686. "Electric contact-making devices particularly for motor controllers." English Electric Co., Ltd., and F. Wilson. June 21st, 1933. (418767.)

17690. "Galvanic batteries and containers therefor." Britannia Batteries, Ltd. June 21st, 1932. (Cognate applications 17691/33, 17692/33, and 17693/33.) (418768.)

17944. "Process for fixing bundles of sheet iron to rotary magnets." J. Bohli. June 23rd, 1932. (418771.)

18048. "Electric relay circuits." Weston Electrical Instrument Corporation. July 7th, 1932. (419006.)

18723. "Electric discharge lamps." Siemens Electric Lamps & Supplies, Ltd., Dobrulux, Ltd., and J. N. Aldington. July 1st, 1933. (418845.)

19601. "Magneto-electric machines especially for internal-combustion engines." J. Bohli and G. Steiner. July 11th, 1933. (Addition to 413716.) (418927.)

20010. "Electric current converting apparatus." International General Electric Co., Inc. July 14th, 1932. (418774.)

20714. "Attachment of metal parts to electric insulators." Corning Glass Works. August 30th, 1932. (418775.)

21063. "Energy-regeneration system for electric locomotives having direct-current series motors." G. Bianchi. July 26th, 1933. (418695.)

21454. "Electric storage-battery carriers for motor or other cycles." E. H. Humphries. July 31st, 1933. (418849.)

21601. "Electric dry cells." Siemens Bros. & Co., Ltd., and C. R. Riber. August 1st, 1933. (418850.)

21816. "Electrically operated cigarette lighters and magazine cigarette cases." D. T. S. Maclennan. August 3rd, 1933. (Cognate applications 34451/33 and 34802/33.) (418928.)

22586. "Electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. November 5th, 1932. (418932.)

23461. "Electric transformers." J. H. Buchanan and Associated Electrical Industries, Ltd. August 23rd, 1933. (418933.)

25801. "Apparatus for controlling the consumption of electrical energy by load devices operating on electrical power systems." T. W. Ross, G. W. Woolnough and Associated Electrical Industries, Ltd. September 13th, 1933. (418782.)

27313. "Means for regulating the current-transmission of grid-controlled discharge valves." Siemens-Schuckertwerke Akt.-Ges. October 4th, 1932. (Cognate application 27314/33.) (418936.)

29726. "Electric hot-plates and similar heaters." F. B. Dehn (Doherty Research Co.). October 26th, 1933. (418866.)

29765. "Electron-discharge tubes or electric incandescent lamps." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 4th, 1933. (418867.)

30362. "Relay systems for producing amplified torque." British Thomson-Houston Co., Ltd. November 2nd, 1932. (418706.)

31762. "Multi-channel carrier transmission system designed more particularly for cable circuits." Siemens & Halske Akt.-Ges. December 22nd, 1932. (418707.)

32766. "Wireless aerials." General Eleectric Co., Ltd., and N. J. McAinsh. November 23rd, 1933. (418708.)

32849. "Automatic or semi-automatic telephone or like systems." Standard Telephones & Cables, Ltd., E. P. G. Wright, C. G. Hartley and F. H. Bray. November 24th, 1933. (418787.)

33041. "Systems for signalling or controlling over electric power mains." Compagnie pour la Fabrication des Compteurs et Materiel d'Usines à Gaz and M. Chirol. November 25th, 1933. (418710.)

33365. "Wireless receiving sets and the like." D. P. Davies. November 29th, 1933. (418711.)

33686. "Cathode-ray tube apparatus for use in television and like systems." Marconi's Wireless Telegraph Co., Ltd. November 30th, 1932. (418940.)

1934

684. "Manufacture of rubber-insulated cables." Siemens-Schuckertwerke Akt.-Ges. January 6th, 1933. (418946.)

3742. "Searchlights." Siemens-Schuckertwerke Akt.-Ges. February 10th, 1933. (418718.)

5487. "Fixed electrical condensers." Marconi's Wireless Telegraph Co., Ltd. February 18th, 1933. (419013.)

7294. "Electric discharge tubes with rotary anodes." C. H. F. Muller Akt.-Ges. March 16th, 1933. (418794.)

8869. "Indirectly-heated cathodes for electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 20th, 1933. (418797.)

10965. "Mechanical interrupters having electrical contact devices which are not subject to the influence of vibrations." Compagnie pour la Fabrication des Compteurs et Materiel d'Usines à Gaz. April 12th, 1933. (419031.)

12782. "Grid-control systems for electric-discharge vessels." Siemens-Schuckertwerke Akt.-Ges. August 28th, 1933. (418804.)

13158. "Electromagnetic relays." General Railway Signal Co. May 24th, 1933. (419035.)

13274. "Magnetos." International Harvester Co. of Great Britain, Ltd. (International Harvester Co.). May 2nd, 1934. (419036.)

15663. "Electric discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 28th, 1933. (418964.)

15740. "Electrically lighted sewing-machine." Singer Manufacturing Co. July 13th, 1933. (419041.)

15995. "Fan cooling means for mercury-arc convertors." English Electric Co., Ltd. August 29th, 1933. (419042.)

16137. "Thermally-controlled electric short-time switches." O. Wolf. May 30th, 1934. (418810.)

17254. "Means for eliminating parasitical oscillations in radio electric reception." G. De Monge. June 27th, 1933. (418811.)

18258. "Luminous electric-discharge lamps." General Electric Co., Ltd. February 12th, 1934. (419045.)

24932. "Electric switches provided with arc-quenching means." Simens-Schuckertwerke Akt.-Ges. August 29th, 1933. (418737.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from November 21st.

G.E.C. No. 548790. Class 11. Accumulators and batteries, induction coils, massage apparatus, apparatus for electrolysis, cautery apparatus, medical and dental lamps, all being electrical contrivances (not medicated) for surgical or curative purposes.—The General Electric Co., Ltd., Magnet House, Kingsway, W.C.2.

Diplomat. No. 554680. Class 13. Torchlight lamps (ordinary).—Salo David Rand, 10, Fore Street, E.C.2.

Photo-electricity and the Chemical Industry

Facts relating to the use of the photo-electric cell in the chemical industry were given by Mr. J. A. Walters in a paper read before the Liverpool Section of the Society of Chemical Industry on November 23rd. The author said that control work demanded a cell of great sensitivity, which could easily be coupled with amplifier circuits to obtain the necessary power for control. Cells to be used for measurement, on the other hand, had consistency or accuracy as a fundamental quality. There were three main types, the conductivity cell, the emission cell, and the rectifier cell. The first was most sensitive and could be coupled to amplifiers; the rectifier cell came next, but had too low an internal resistance for easy amplification; while the vacuum emission cell had the lowest sensitivity, but was easily adaptable to amplification. So far as consistency and accuracy were concerned, the conductivity cell was quite out of the running; the vacuum emission cells were best in that respect, but the rectifier cells were a very good second, and were often employed for measurement on account of the simplicity of their associated circuits.

Commercial units were now available for control work and had been used successfully in many industrial problems. They consisted of a photo-cell and valve amplifier with a relay and were suitable for direct connection to mains.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abergavenny.—Houses (24), Govilon; S. D. Bevan, builder.

Aberystwyth.—Houses (180), Padarn Crescent, for Andreas Jones.

Ashbourne.—Houses (100), Clifton Road; U.D.C. surveyor.

Ayrshire.—Primary school, Kilmarnock (£16,310); architect, County Education Committee, Ayr.

Bath.—Houses (128), Shophouse Road, Twerton; city engineer.

Beaconsfield.—Council offices (£3,000), Twin Oaks site; Burgess, Holden & Watson, architects.

Becontree.—Houses (268), north of Gale Street Railway Station; L.C.C. Housing and Public Health Committee.

Bedfordshire.—Boys' secondary school, Luton (£50,000), for County E.C.; director of education, Bedford.

Bedlington.—Clinic and child welfare centre, Guidepost, Choppington; U.D.C. surveyor.

Bexhill-on-Sea.—Houses (30), London Road; borough engineer.

Blackpool.—Factory at the corner of Coleridge Road, Devonshire Road and George Street, for Waller and Hartley, Ltd., George Street; Halstead Best, architect, Leeds Buildings, 20, Clifton Street.

Brierley Hill.—Congregational church, Quarry Bank; A. J. Crump & Sons, builders, Dudley.

Buckinghamshire.—Senior school, Langley, and girls' high school, Eton, for County E.C.; director of education, Aylesbury.

Burton-on-Trent.—Factory, Branston; Marley Tile Co., Harrietsham, Kent.

Cardiff.—Houses (88), Sloper Road; City engineer.

Cheshire.—School, Park Road, Timperley, and extensions to Parkside Mental Hospital, Macclesfield (£100,000); county architect, Chester.

Chippenham.—Extensions to Isolation Hospital, including ward block (£3,000), for Chippenham and Malmesbury Joint Isolation Hospital Committee; T. Walker, County architect, Trowbridge.

Croydon.—Houses (25), Sundial Avenue; Central Estates Co., Ltd. Extensions to public slipper baths, washhouses, &c., Windmill Road; borough engineer, Town Hall.

Darfield (YORKS).—Houses (57), Doncaster Road, for D. Hammerton.

Darlington.—Aerodrome; borough engineer.

Darton.—Offices (£5,480); Dyson, Cawthorne & Cole, architects, Regent Street, Barnsley.

Derbyshire.—Secondary school, Clay Cross; County architect.

Dorset.—County library, clinics, and central dispensary, Dorchester (£5,750); County architect, Dorchester.

Dudley.—Extensions to Guest Hospital (£25,000), electrical work; A. T. Butler, architect, Priory Street.

Dundee.—New advanced division R.C. school (£78,615); City architect.

Dunstable.—Cinema, ball room, café, &c., High Street North, for Southan Morris Circuit, Ltd., proprietors of the Palace Cinema.

East Suffolk.—School (200 places), Framlingham; county architect.

Edinburgh.—Offices, Tollcross Tramway depôt; E. J. MacRae, City architect.

Essex.—Senior school, Pettits Lane, Romford; County architect.

Faversham.—Houses (24), Gordon Field Estate; borough surveyor.

Folkestone.—Extensions to Royal Victoria Hospital (£30,000), for the Board of Management.

Gateshead-on-Tyne.—Congregational church, Appledore Gardens; J. W. Corking, architect, 16, West Street.

Girvan.—Houses (170), Bourtree hall site; burgh surveyor.

Glasgow.—Houses (351), Bilsland Drive (£100,000); City architect. School and child welfare clinic; architect, Office of Public Works.

Grantham.—Extensions, Hospital (£30,000); governors.

Greenock.—Houses (840), Gibbshill and Bogston (£3,000); J. Edwards, 260, Great Western Road, Glasgow.

Hamilton.—Houses (224), Bent Farm site; Gavin Paterson & Son, architects.

Hampshire.—Secondary school, Farnborough (£38,500); County architect.

Hanley.—Houses (36), Etruscan Street and Cavour Street. Etruria; F. Gibson.

Hastings.—Houses (126); S. Little, borough engineer.

Hereford.—Elementary schools, Westfields, for E.C.

Heston and Isleworth.—Junior school (400 places), Busch Corner; J. G. Carey, engineer, Council House, Hounslow.

Hinckley.—Extensions to factory for Harvey, Harvey & Co., Ltd., King Street, Barwell, near Hinckley; Archer, Son & Lockley, builders, Shilton Road, Barwell.

Horsham.—Houses (300), Guildford Road and Rushams Road; Davis Estates (Kent and Sussex), Ltd.

Huddersfield.—Block of flats, Southgate (electrical work); borough engineer.

Irish Free State.—(KILRUSH, Co. CLARE).—Technical school, for the County Clare Vocational E.C., Courthouse, Ennis; Dowling & Aiken, architects, 1, Bindon Street, Ennis.

Kenilworth.—Houses; U.D.C. surveyor.

Kent.—Schools, Bexley, Gravesend, Margate, and Sevenoaks, also extensions to County School for Girls, Dartford, and Sessions House, Maidstone (£8,500); County surveyor.

Kingston-on-Thames.—Block of flats; borough surveyor.

Knutsford.—Cinema, Toft Road; Mr. Ogle, Stockport.

Lanarkshire.—Adult mental defective colony, Hartwood Hill (£160,000), for C.C.; clerk, Glasgow. School, Hamilton, for County E.C.; director of education, Renfield Street, Glasgow.

Lancashire.—Reconstruction, Whittingham Mental Hospital and nurses' home (£98,000), and reception hospital and convalescent wards, Lancaster Hospital, for the Mental Hospitals Board; clerk, Preston.

Leven (FIFE).—Cinema, North Street; Alex. Stevenson, Methil, Fife.

Llandudno.—Houses, Maesdu; U.D.C. surveyor. Hospital (£30,000), for Llandudno and District Hospital Board of Management; secretary. —

London.—(CATFORD).—Houses, Bellingham Road; G. T. Harman. (EALING).—Houses (56), Brunswick Road and Gardens, and houses (42), Sandall Road; J. M. Wilson, architect, Bloomfield Bldg. Co., Ltd. Houses (60), Cow Lane (£18,452); Cain & Co. Houses (70), Twyford Avenue, &c.; R. Lancaster & Sons. Houses (53), Wadham Gardens, Currey Road, &c.; R. Fielding & Son. Houses, two schools, shops, &c., Cuckoo Schools Estate; L.C.C. architect. Showrooms and flats, Uxbridge Road; E. Schaufelberg, architect, Balbus, Ltd. Three schools, Western Avenue, Northolt; borough engineer. (HAMMERSMITH).—Secondary school, Ducane Street (£50,000); L.C.C. architect. (LEE).—Shops and flats, Burnt Ash Hill; A. J. Butcher. (LEWISHAM).—Dispensary and maternity and child welfare centre (£14,247); Town Clerk. Elementary school, Hall Park Estate; L.C.C. Education Committee. (PLUMSTEAD).—Extensions to Wickham Lane Schools (£16,650), for London E.C. (FINCHLEY).—Houses, North Circular Road; borough engineer. (ST. PANCRAS).—Houses, Ferdinand Place (£74,000); B.C. engineer.

Lowton.—Houses (48), Bodden Street and Sandy Lane; Maxwell Real Estate Co., 216, Seabank Road, Wallasey, Cheshire.

Manchester.—Cinema, for Bernstein Theatres, Ltd. Exhibition hall, Queen's Road, Miles Platting (£400,000); A. Winstanley, architect, 15, Great Ducie Street.

Mansfield.—Houses (52), cleared areas; borough engineer. Houses (22), Forest Avenue; Thos. Fletcher.

Mexborough.—Houses (102), Windhill and Cowper Road sites; U.D.C. surveyor.

Middlesex.—Elementary school, Vincent Road, Wembley; secretary to County E.C. Central county hospital nurses' recreation hall (£5,500); County surveyor.

Mildenhall.—Cinema (electrical work), for D. F. Bostock, Bury St. Edmund's Playhouse; Gill & Son, builders, Norwich.

Mill Hill.—Shops, Barnet By-Pass, Selvage Lane; Ernest Owers, Ltd.

Neath.—Senior school (£11,000), for Borough E.C.; A. J. Evans, clerk.

Nottingham.—Offices for the River Trent Catchment Board; Gregory & Robinson, architects, Castlegate Chambers.

Oldham.—Extensions to institution for Borough P.A.C.; C. T. Taylor, Roberts & Bowman, architects, 10, Clegg Street.

Oxford.—Houses (22), Quarry Fields Estate, Headington (road No. 2); A. E. Harris. Isolation hospital, &c., Brasenose Farm Estate, Cowley; Oxford City architect. School, Florence Park, Headington, and Milham Ford; City E.C.

Penrith.—Houses (26), Salkeld Road; Co-operative Society.

Prestwick (AYR).—Cinema, Main Street (£15,000), for a local syndicate; W. Gardner, solicitor.

St. Albans.—Houses (34), Folly Lane; Miss C. J. Walker.

Sale (CHESHIRE).—Lido, with ballroom, cafés, &c. (electrical work), for Sale Lido, Ltd. (£23,350); A. E. Lancashire, architect, Preston.

Seaham Harbour.—Extensions to elementary school (£12,000); F. Willey, architect, 34, Old Evet.

Shanklin.—Aerodrome, with hangars, passengers' waiting rooms, and engineers' departments, for E. H. Bryne, proprietor of the Shanklin Flying Services.

Skegby.—Houses (64), Healdswood site; L. Dodsley, architect, Portland Chambers, Sutton-in-Ashfield.

Solihull.—Offices and public hall (£26,210); U.D.C. surveyor.

Southgate.—Houses, Avenue Road; Harwood Nash & Co. Houses (28), Chase Road, and The Larches, 76 houses; G. W. Newman. Houses, Nursery Road; Harwood Nash & Co. Houses, Oak Lodge Estate; J. Neilson.

Southsea.—Auto telephone exchange, for H.M. Office of Works, King Charles Street, London, S.W.

Stirling.—Houses (100); burgh surveyor.

Stockport.—Secondary School for Boys, Mile End, for E.C.; L. Yates, Chief Architect, architects' department, Education Offices, Town Hall.

Stockton-on-Tees.—Houses (278); J. P. Wakeford, borough engineer.

Stoke-on-Trent.—Houses (350), Sandon Road, Meir; Workmen's Housing Association (1933), Ltd. Houses, Stone Road. Trent Vale; P. Bailey & Co., Ltd. Swimming pool, Smith's Pool, Fenton; borough engineer.

Strood (KENT).—Houses (22); R.D.C. surveyor.

Sunderland.—Houses (380); E. Hitchens, R.D.C. surveyor, Boldon.

Surrey.—School, St. Helier (£13,217); Ashford Builders Co., Ltd.

Swaffham.—Houses (50); U.D.C. surveyor.

Tenbury.—Houses (50); R.D.C. Housing Committee.

Thornbury (YORKS).—Houses (118), Ducketts Lane; Modern Homes, Ltd., Calverley.

Uttoxeter.—Cinema, Old Manor House site, for F. P. Birch, Ashbourne.

Wallasey.—Houses, Mersey Street (£24,500); borough engineer.

Weetslade (NORTHUMBERLAND).—Houses (70); U.D.C. surveyor.

West Riding.—Schools, Bawtry, and Ward Green, Worsborough, for County E.C.; director of education, Wakefield.

Whitby.—Houses (105), Gallows Close Estate; J. R. Seward, U.D.C. surveyor.